



PRINCIPES

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THE INTERNATIONAL PALM SOCIETY

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Cover Picture

Parajubaea torallyi growing at 2000 m, Vallegrande, Depto. Santa Cruz, Bolivia.

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Editorial

The 1994 Biennial held in June in Caracas, Venezuela, was one of the happiest and most enjoyable IPS Biennials we have attended. Much of the success and enjoyment of the Biennial is due to President Jim Cain's vision to hold it in Venezuela, the efficiency of our tour operator, Lost World Adventures, and the warm and enthusiastic hospitality of our Venezuelan hosts, Avepalmas, the Venezuelan Palm Society. For us editors, the Biennial represents one of the few opportunities we have to meet a large number of members of the Society and we always enjoy the chance to talk and learn about palms. As always, we were impressed by the wealth of experience with palms that you the members have, and we want, yet again, to encourage you to share with us all some of your more unusual experiences with palms by writing. Some such palm information may only have local significance, and would be suitable for a chapter bulletin, but if you think that you have information of interest and value to the world palm readership, please submit an article to *Principes*—the international journal.

At the board meeting of the IPS the Directors voted to join the Royal Botanic Gardens Kew in the co-publication of "The Palms of Madagascar" by one of your editors (JD) and Henk Beentje. By agreeing to join Kew, the Society will allow us to produce a large format book lavishly illustrated with color. To whet your appetite we have included a short article on *Chrysalidocarpus decipiens*, one of the most magnificent palms of Madagascar and featured also on the back cover.

The Board also voted to allow expenditure on the printing of color plates within *Principes*, not just on the covers. So, watch out for the change to full color in the near future.

We feature another unusual palm growing in its natural habitat in the article by Michael Balick and Dennis Johnson that discusses *Schippia concolor* in Belize and its conservation status. The article also includes a useful key to identify the fan palms in Belize should you find yourself wandering about the forests there.

It has long been common knowledge that the date palm, *Phoenix dactylifera*, requires a dry climate in order to grow and fruit well. However, there are cultivars of this important food plant that can survive in more humid climates. Laurence Bains describes such cultivars that are resistant to fungal disease prevalent in humid environments and shows how they perform in Florida.

Continuing the story of the coconut in East Africa that Hugh Harries began in January *Principes* this year, he, together with E. Krain, J. A. Issa and A. Kullaya provides us with an account of the so-called Pemba Dwarf in the island of Zanzibar. Pemba, you will remember, is the small island off the coast of Tanzania that is the home of the endemic palm *Chrysalidocarpus pembanus*; it seems that the island is also remarkable as a source of dwarf coconuts.

For palm growers in temperate regions climatically restricted as to which palms can be grown, *Parajubaea torallyi* has always been of interest. A beautiful palm of mid elevations of the Andes of Bolivia, this has until recently been a poorly known species. How cold-tolerant is the species? Will it perform as well as the only other member of the genus, *P. cocoides*. Israel Vargas in his article provides a wealth of information on its ecology and uses, information that will be particularly useful to IPS members who were lucky enough to receive seed from the population described, distributed via the Seed Bank. As is so often the case with other palms, this species is intensively utilized.

Melvin Schmidt in his article describes the remarkable petrified palm wood found in Louisiana. His examination of the internal structure of the wood suggests that the greatest similarity of these fossil palms is with the modern genus *Phoenix*, that, of course, is unknown in the wild in the New World today.

Don Hodel describes the future of many of his own living research specimens, now well housed in the Virginia Robinson Gardens in California.

Finally, as a filler, Wulf Killmann and one of your editors provide a short photo feature illustrating some of the palms that are depicted on the bas-reliefs of Angkor Wat and Borobudur, the great ancient temples of Southeast Asia.

JOHN DRANSFIELD
NATALIE UHL

The Conservation Status of *Schippia concolor* in Belize

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Schippia is a monotypic genus consisting of a single species, *S. concolor*. It was described by Burret (1933) from material collected in Belize by William A. Schipp. The type locality is listed as "19 mile Stann Creek Valley." It has a limited distribution within Belize, primarily in the Belize, Cayo, and Stann Creek Districts. The vernacular name for this palm in Belize is "silver pimento" or "mountain pimento." Johnson et al. (1986), in their survey of the levels of endangerment of New World Palms, suggested that *Schippia concolor* should be maintained in the "Endangered" category, as recent attempts to study it in Belize had resulted in only a single plant being seen. In order to clarify the status of this genus and develop further information on its natural range, numerous observations have been made during fieldwork in Belize and Guatemala from 1987 to the present.

Description of *Schippia concolor*

The genus *Schippia* is in the subfamily *Coryphoideae*, in the tribe *Corypheae* and in the subtribe *Thrinacinae* (Uhl and Dransfield 1987). It is closely related to *Cryosophila*, *Thrinax*, and *Coccothrinax*, and misidentification among the four genera is common.

Schippia concolor has a solitary, slender, unarmed, rough trunk to 10 m in height that is gray in color. The arching palmate leaves are a dark, glossy green above and dull beneath, about 1 m broad, with petioles about 2 m long. Leaves and petioles also are unarmed and arrayed in an open crown that gives the palm a delicate and graceful appearance. The pendant inflorescences are twice or thrice branched and about 60 cm long and bear both staminate and pistillate flowers. Fruits are globose, about 2.5 cm in diameter, and white when mature (Fig. 2).

Schippia in Belize

In forested habitats in Belize, *Schippia concolor* often occurs with populations of other palms,

including *Thrinax radiata* Lodd. and *Cryosophila argentea* Bartlett. At first glance it is sometimes difficult to separate the taxa. The following key, modified slightly from Standley and Record (1936) and with data from Zona (1990), can be used to separate the palmate-leaved species of Belizean palms.

- Leaves palmate, with very numerous plaited segments.
1. Petioles armed with coarse stout spines *Acoelorrhaphe wrightii*.
 1. Petioles unarmed.
 2. Leaf blades divided at the middle to the base.
 3. Trunk unarmed *Schippia concolor*.
 3. Trunk armed with long spines *Cryosophila argentea*.
 2. Leaf blades not bilobed.
 4. Leaf blades with a well-developed rachis extending for about half their length *Sabal*.
 5. Petiole 2-3 m in length; segments in groups of 2-3 and united for nearly their entire length, the middle segment 125-200 cm long; inflorescence with 4 orders of branching *Sabal mauritiiiformis*.
 5. Petiole 0.5-2 m in length, segments in groups of 2, rarely 3, and united for nearly 50% of their length; the middle segment 125-200 cm long; inflorescence with 3 orders of branching *Sabal yapa*.
 4. Leaf blades with a very short rachis or the rachis almost absent.
 6. Fruit black at maturity; trunk with a network of fiber about the base of the leaves but without dense pads of "wool," endosperm channeled *Coccothrinax argentea*.
 6. Fruit whitish at maturity; trunk with thick pads of wool-like fibers about the bases of the petioles; petiole bases with a central triangular cleft; endosperm smooth *Thrinax radiata*.

Although Steyermark (Standley and Steyermark 1958) suggests that *Schippia* may be present in Guatemala, extensive reconnaissance by H. J. Quero failed to find it in that country (Quero, personal communication). A search for the herbarium specimen purported to be *Schippia concolor* from Guatemala (Steyermark 45538) has been unsuccessful. A brief trip by Balick to Tikal and environs in 1993 also failed to locate any



1. Habitat of *Schippia concolor* in the pine forest of St. Augustine. (Photo by M. Balick.)

evidence of *Schippia*. Therefore, distribution of *S. concolor* in Guatemala cannot be proven. We consider the palm endemic to Belize.

Field Observations

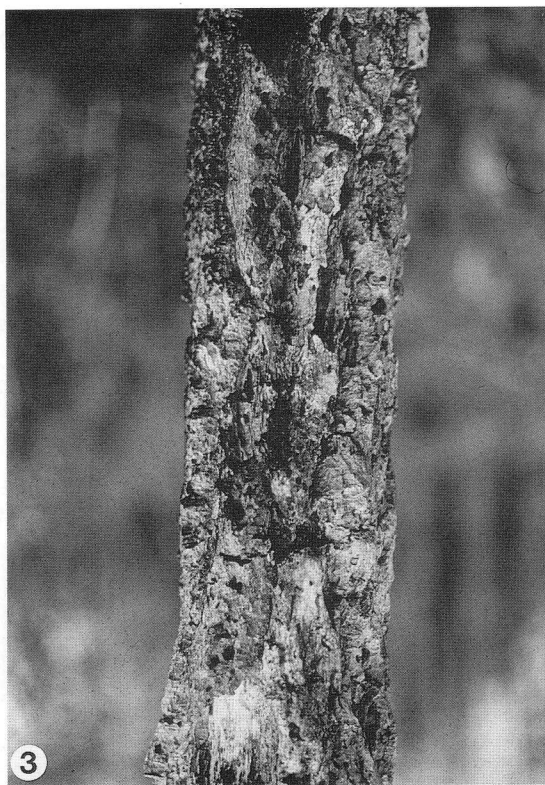
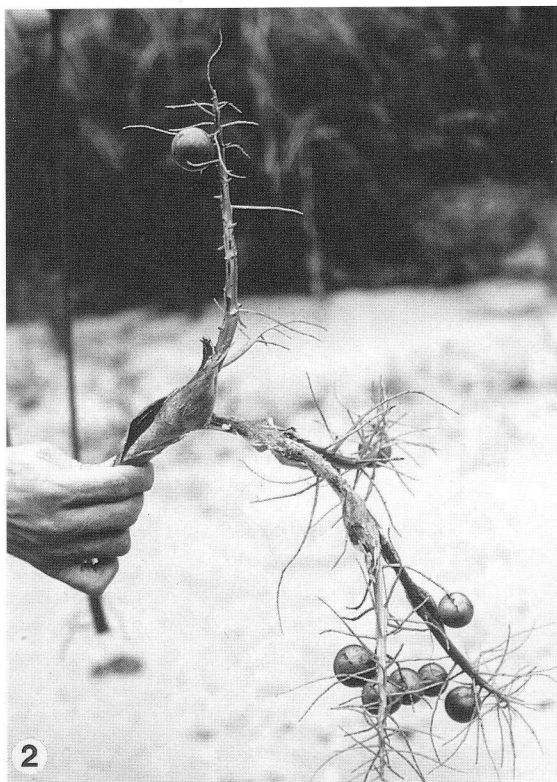
Schippia concolor was observed to be a common species on Mountain Pine Ridge, St. Augustine, at an elevation of ca. 500 meters (Fig. 1). This is an open area of pine forest (*Pinus caribaea* var. *hondurensis*) subject to frequent burning. The bark of many plants in this area, including *Schippia concolor*, is thick and corky, suggesting an adaptive mechanism to the area's frequent fires (Fig. 3). Fires seem to inhibit regeneration of the palms, as the seedlings observed under the individual mature trees were quite young (Fig. 4), and a complete assortment of palms at various life stages, as one might expect in an actively reproducing population, was not found in these fire-influenced habitats. In general, this species seems to occur in small populations, from ca. 2 or 3 to 50 plants in a single area.

Another site studied was along the Western

Highway ca. 25 miles from Belize City. There *Schippia concolor* is found in a dense forest formation that appears frequently inundated and not subject to fires. The palm was also found growing on the grounds of the Belize Zoo and its environs, ca. 11 miles south of Belize City (Fig. 5). The habitat is a more open area of forest than at the mile 25 site. *Schippia concolor* is also found at additional sites along the Western Highway between mile 27.5 to 28.5, mile 30-31, 32-33, and at mile 39.

One herbarium collection (*M. J. Balick et al.* 1845) was made at the base of the Mountain Pine Ridge reserve along the road from San Antonio at an elevation of ca. 230 meters. This was in an area of undisturbed subtropical moist forest, and it was noted that the "bark" of *Schippia concolor* was not as corky as in the Mountain Pine Ridge area (Fig. 6).

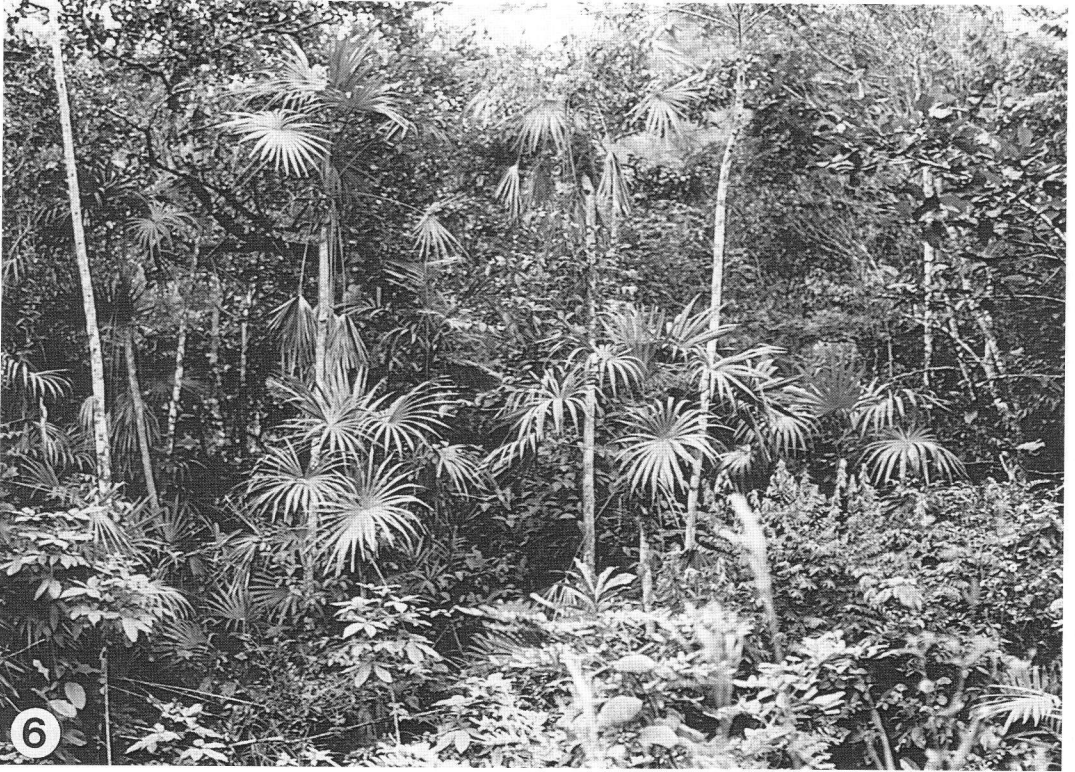
Schippia concolor was also noted at Ix Chel Farm, 10 km south of San Ignacio (Cayo District). This is in primary forest in association with *Cryosophila argentea* and *Thrinax radiata*. A col-



2. Inflorescence and fruits of *Schippia concolor*. (Photo by M. Balick.) 3. Stem of *Schippia concolor* growing in habitat exposed to frequent fires. (Photo by M. Balick.)



4. Seedlings of *Schippia concolor* growing under adult tree. (Photo by M. Balick.) 5. *Schippia concolor* in scrub forest environment near Belize Zoo. (Photo by M. Balick.)



6. *Schippia concolor* in subtropical moist forest habitat at base of Mountain Pine Ridge. (Photo by M. Balick.) 7. Destruction of *Schippia concolor* habitat along the Western highway. Pine trees are being logged out. (Photo by M. Balick.)

lection was made (*M. J. Balick et al.* 1976), although no fruits or flowers were included. This represents a new locality for the species and further extends its range within Cayo District.

Other sites where *Schippia* was observed or collected include the Cockscomb Basin Jaguar Preserve in Stan Creek District, 10 km west of Maya Center and Vaca Falls in the Cayo District, growing on the rocky cliffsides overlooking the Rio Macal.

Fruiting of *Schippia concolor* occurs in September. By November, only remnants of fruits, as well as a very few fruiting mature panicles are to be seen. This palm has no reported economic use, apart from being grown for ornamental purposes.

Conservation Status in Belize

According to Hartshorn et al. (1984) Belize is not subject to the high rates of deforestation as are other areas of the tropics, although pressures for farmland are increasing. The influx of tens of thousands of political refugees from neighboring countries in recent years has placed a great deal of stress on the forests along the Belmopan–Stann Creek road and south to Punta Gorda. Recently there has been implementation of large agricultural projects in other areas that are resulting in massive forest clearing (Fig. 7). For example, a major hydroelectric project will also destroy some of the populations of *Schippia concolor* in the Rio Macal Valley. All of this could change the current validity of Hartshorn et al.'s 1984 assessment.

While it appears that no immediate threat to the existence of *Schippia concolor* in Belize exists at the present time, the fate of individual populations appears more questionable. The most protected populations are found in a forest reserve, Mountain Pine Ridge. It should be noted that, due to the frequent fires, the palms do not appear to be regenerating in sufficient numbers to maintain extensive populations over the long term. Another protected site is the Ix Chel Farm, where the owners (Drs. Rosita Arvigo and Gregory Shropshire) are intent on preserving the forest where the species has been discovered. Palms in areas such as the base of Mountain Pine Ridge or along the Western Highway are at far greater risk of

destruction because of the pressures for development of this area, with the exception of the land owned by the Belize Zoo. In conclusion, it appears that while some populations are in danger of extinction, the genus as a whole in Belize is probably safe for the near future. Given the circumstances described above, it is recommended that the conservation status of *Schippia concolor* be changed from "Endangered" to "Vulnerable" in Belize. Increased harvest of the seed for cultivation of this ornamental tree in other regions is recommended as a way of encouraging the wider scale distribution of the Belizean endemic palm. According to Botanic Gardens Conservation International, *Schippia concolor* is in cultivation at Royal Botanic Gardens, Kew, and Fairchild Tropical Garden, Miami (BGCI 1993).

Acknowledgments

We are grateful to Drs. Rosita Arvigo and Gregory Shropshire for their interest and companionship in the field and to the Forestry Department of the Ministry of Agriculture, Forestry and Fisheries for granting permission to undertake fieldwork in Belize. The kindness of Mick and Lucy Fleming of Chaa Creek and Lou Nicolait is also acknowledged. We are grateful to Dr. Andrew Henderson for his comments on the manuscript.

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Chrysalidocarpus decipiens

HENK BEENTJE AND JOHN DRANSFIELD

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Readers of the bulletin of the Southern California Chapter of the International Palm Society, the *Palm Journal*, will be well aware of the horticultural interest in *Chrysalidocarpus decipiens* Beccari. *C. decipiens* is one of the grandest palms there is. Native to the central plateau of Madagascar, it is now rare in the wild and, perhaps surprisingly, it has only relatively recently become widespread in cultivation outside Madagascar. In fact we know of no mature adult palms in cultivation outside its native country.

Early Confusion

The name *Chrysalidocarpus decipiens* was established by Beccari in 1906, based on specimens collected by the English missionary, the Reverend Baron (after whom *Neodypsis baronii* is named), from “Central Madagascar” (probably Andrangolaoka, east of Antananarivo) and by the German plant collector, Hildebrandt (after whom *Dypsis hildebrandtii* is named), from Ankafina forest near Fianarantsoa, in the southern plateau area. At this time (1906) the fruit was still unknown.

Eight years later, in 1914, more specimens had been collected, notably by the French collector Perrier de la Bâthie, and Beccari could amplify his description of *C. decipiens* when he wrote his monumental work “Palme del Madagascar.” Unfortunately he mixed two palms in his description—true *C. decipiens*, including some fruiting material, and *Neodypsis basilongus* of Jumelle and Perrier, a more coastal species with ruminant endosperm that was held to be typical for *Neodypsis*.

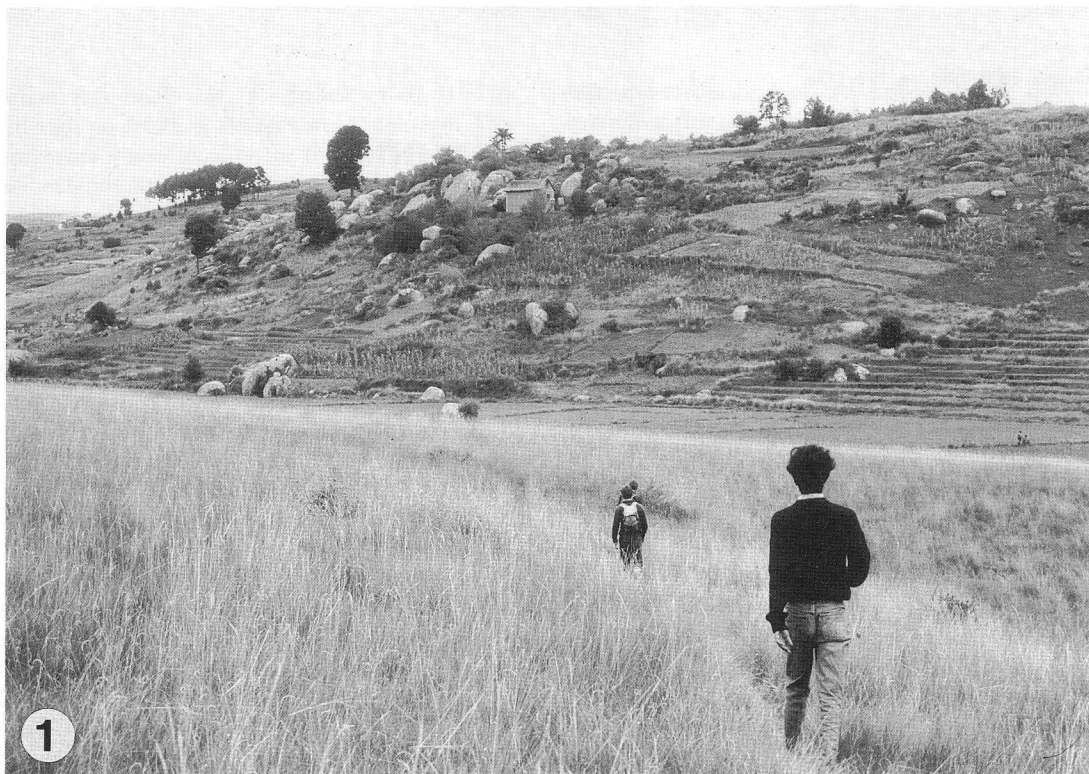
Since the resulting “species” combined characters from two genera, Beccari felt it necessary to establish a new genus *Macrophloga*. The resulting species, *Macrophloga decipiens* (Beccari) Beccari existed for eight years, until Jumelle sorted out the confusion and put all the constituent parts back in their proper species.

However, this is not the end of the story. During

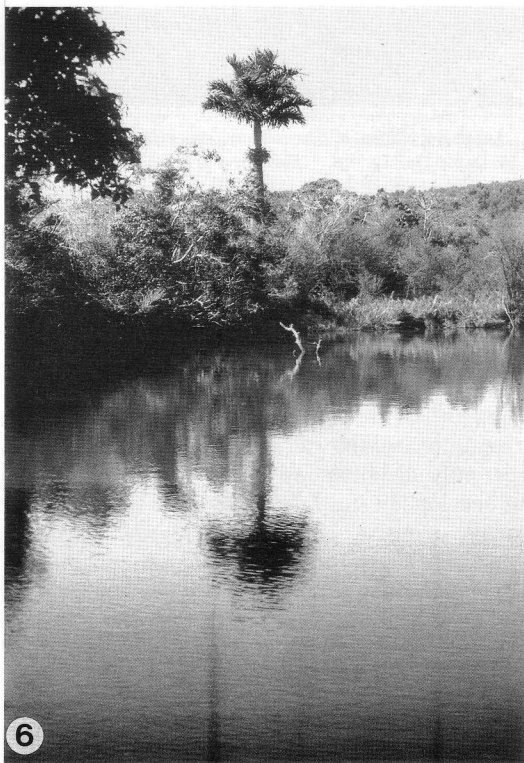
our research on the palms of Madagascar over the past eight years, it has become increasingly apparent that the major differences between groups of species that allow us to define and maintain genera as distinct from each other just do not exist in the group of palms, the Dypsidinae, to which *Chrysalidocarpus* belongs. A wealth of new species and complete material of many of the previously described species have provided the evidence that has forced us to regard all members of the Dypsidinae as belonging to a single large and very varied genus *Dypsis*. The extremes of this genus are very distinct but they are connected to each other by series of intermediates that have completely blurred any previously conceived boundaries. The dreaded name changes that will ensue have not yet been formalized so we can continue in the mean time to use the name *Chrysalidocarpus decipiens*. Our complete findings will be published as a book on the palms of Madagascar, we hope in 1995.

C. decipiens in Cultivation

Within Madagascar, this wonderful squat “bottle” palm, *Chrysalidocarpus decipiens*, is grown in gardens on the plateau, but only rather rarely. There are fine examples in the Parc de Tzimbazaza in the center of the capital, Antananarivo, as illustrated in Nancy Edmonson’s article in the May 1993 issue of the *Palm Journal*, and a few young individuals in gardens on the road between the airport at Ivato and the capital. South of Tana, in the nearby town of Ambatolampy there are some really splendid old trees along the roadside near the town center. When one sees mature trees of *C. decipiens*, one wonders why so few people grow them. Who needs *Hyophorbe* when there is such a fine alternative? There is another feature of the palm that should particularly excite palm growers in the cooler tropics and subtropics and of which growers in southern California are already aware. *Chrysalidocarpus decipiens* is a palm of the high plateau of Madagascar, an area that is



1. Cultivated hillslope south of Ambositra; *Chrysalidocarpus decipiens* survives as a small population here. 2. *Chrysalidocarpus decipiens* in open native scrub south of Ambositra.



3. Henk Beentje stands beside an almost mature individual of *Chrysalidocarpus decipiens* in cleared land south of Ambositra. 4. Two stems of *Chrysalidocarpus decipiens* in cleared land south of Ambositra. 5. A fine clump of mature *Chrysalidocarpus decipiens*, south of Ambositra. 6. A lone individual of *Chrysalidocarpus decipiens* growing beside a river on the plateau north of Antananarivo.



7: Large population of *Chrysalidocarpus decipiens* growing in open vegetation on a rocky hillslope west of Ambositra. Photo by David DuPuy. 8. Flowering and fruiting *Chrysalidocarpus decipiens*, west of Ambositra. Photo by David DuPuy.

relatively cool and, at times, quite dry. Here is a palm that should do really well in, for example, southern California or coastal New South Wales, perhaps even in the south of France. Another extraordinary feature of the palm is that in early growth, while the palm is still establishing itself in a rosette phase, the still underground stem forks, apparently dichotomously, and two aerial stems can develop. In the July 1993 issue of the *Palm Journal*, mention is made of Mardy Darian's remarkable *C. decipiens* with seven trunks; in the wild we have not seen more than two equal sized trunks growing together, but it is always difficult in the wild to decide whether small shoots at the base of a palm represent suckers or seedlings. A few mature individuals in Tzimbazaza retain paired stems, but it seems that, quite often, one of the pair is weaker than the other and may eventually die.

Where does this palm actually survive in the wild and what is its natural habitat?

Distribution in the Wild

All of our records of *Chrysalidocarpus decipiens* in the wild are from the high plateau at elevations of 1200–2000 m above sea level. We have observed the palm growing beside water courses, on steep slopes among boulders, and on the tops of plateaux. In all localities where we have observed it, the vegetation has already been much modified by man, and regeneration of the palm seems very limited indeed. In one locality south of Antananarivo, we found a population of about 50 individuals of varying age scattered in scrubland composed of native Madagascar species and in man-made grassland. Nearby there was a rare relict stand of high-plateau primary forest, a forest composed of small-leaved trees with much moss and the scrambling bamboo, *Hickelia madagascariensis*, but with no palms at all. Perhaps *C. decipiens* is adapted to growing in rather open habitats such as steep slopes and boulder fields,

rather than in closed primary forest, and this may provide a clue as to why it seems to perform so well in subtropical gardens. However, we have observed it once north of Ranomafana in remnants of wet forest and once in submontane mist forest with low canopy east of Ambositra.

Our observations suggest that this is a palm of restricted distribution and with limited regeneration in the wild. Even though it may occur in

remoter areas in some abundance, as has been reported by a friend for an area west of Ambositra, its survival in the wild must be a cause for concern. Yet, as a horticultural subject, it promises to be a popular, easily grown and adaptable species for subtropical gardens, the only major requirement for which is space—space to develop its splendid trunks and spreading crowns of plumose leaves.

CLASSIFIED

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Phoenix dactylifera Cultivars with Resistance to Graphiola Leaf Spot

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This article is part two in a series on the cultivation of *Phoenix dactylifera* in a humid rainy climate. The last article addressed the possibility of producing edible dates in Florida and was published in the "Central Florida Palm Bulletin," volume 12 no. 4. This article will discuss the limiting factor of *Graphiola* leaf spot on *P. dactylifera* in Florida and possibly overcoming it.

In 1901 John V. Watkins described *P. dactylifera* in his book "Florida Landscape Plants" as "A very stately feather palm making an excellent free standing specimen or avenue tree." *Phoenix dactylifera* adorned the grounds of many central Florida citrus belt estates around the turn of the century. There are still *P. dactylifera* thriving in open areas of the Ocala National Forest, apparently once a homestead now long abandoned, attesting to their hardiness. Forgotten for years in central Florida landscapes, *P. dactylifera* is once again becoming fashionable, appearing at theme parks, resorts, and in city landscape plans. The recent surge of interest in the date palm is due in part to the lack of damage they received in the 1980s freezes, but also to their stature. *Phoenix dactylifera* and *Phoenix sylvestris* are the tallest growing feather palms for central Florida. However, most Floridians aren't getting the true impression of the beauty of the date palm because of the cultivars being imported. "Zahidi" and "Deglet Noor" are two of the three most imported varieties for Florida and also suffer the most disease caused by the fungus *Graphiola*. Several cultivars have shown more resistance than others to *Graphiola*. In humid climates *Graphiola* thrives and attacks the older fronds causing a reduction of chlorophyll and resulting in a ragged-looking leaf that must be removed, hence the "feather duster look" (Figs. 1,2). Some may like the "feather duster" look because of the formal appearance it gives the palm, but for those who don't there is an alternative. *Graphiola* does not pose much of a problem in arid climates, and

consequently date palms have a fuller crown. In humid climates fungicide could be used to control *Graphiola* but this would be impractical on large specimens. The easiest way to control *Graphiola* is through the cultivation of more resistant varieties.

In 1957 Roy W. Nixon studied several *P. dactylifera* cultivars in Weslaco, Texas in the lower Rio Grande Valley where the humidity is high. In Nixon's study there were differences in the amount of infection by cultivar, the most severely infected being "Zahidi" and "Deglet Noor." Surprisingly the two most severely infected cultivars are the main ones used in Florida landscape projects. The "Kustawy" cultivar was the least infected in Nixon's study, although this cultivar is now thought to be extinct in the United States. The "Amir Hajj" cultivar was moderately infected. The USDA also reports that "Amir Hajj" came through six days of rainy weather in Winter Haven, Texas (between Laredo and San Antonio) without fruit spoilage. The "Amir Hajj" is still available in the United States. Nixon had a second test field 200 miles northwest of Weslaco in Crystal City where the humidity is on average 10% lower. The Crystal City site had different cultivars and Nixon reported "Jozee" and "Tadala" as being only slightly infected with *Graphiola*; both are also thought to be extinct in the United States.

In 1970 another study was conducted on *Graphiola* leaf spot by the Punjab Agricultural University in Abohar, India. M.K. Sinha, R. Singh and R. Jeyarajan found that several cultivars ranked high in resistance to *Graphiola*. The only cultivar ranked high in resistance that I was able to find in the United States was "Barhee." Moderately resistant were "Medjool," "Thoory" and "Halawy," while "Dayri" was severely infected with *Graphiola*; surprisingly, as the fruit of the "Dayri" is probably the most tolerant cultivar to rain and humidity. Ironically, it appears that the fruit and foliage respond to humidity indepen-



1. "Zahidi" variety in Orlando imported several years ago from California displaying "feather duster" crown.

dently of one another. The fruit of a specific cultivar could have a high resistance to humidity but the foliage a low resistance to *Graphiola* fungus and vice versa. The "Barhee" cultivar appears to fit both categories of fungus resistance to the foliage and moderate humidity and rain tolerance to the fruit. "Barhee" is also unique in that the fruit has a relative absence of astringency or tannin flavor in the early stage of ripening. Fruit from "Barhee" does not have to remain on the tree as long exposed to rain and humidity. In the Punjab research the chlorophyll content was also studied in several cultivars and it was found that "Barhee" retained much of the chlorophyll in the older leaves. "Halawy" maintained a moderate amount while "Zahidi" and "Deglet Noor" lost severe amounts of chlorophyll in the older leaves to *Graphiola*.

Finally in 1985 F. W. Howard, R. Atilano, and D. Williams at the University of Florida Agricultural Research Center in Ft. Lauderdale studied "Halawy," "Zahidi," and "Deglet Noor." The study examined the number of fronds badly dam-

aged by *Graphiola* leaf spot. The "Halawy" cultivar lost the fewest leaves while "Zahidi" and "Deglet Noor" lost the most.

Most Florida nurseries label smaller *P. dactylifera* without a varietal name mainly because the variety is not known. Unnamed varieties were probably started from an unknown seed source which could also result from hybridization. When selecting *P. dactylifera* for Florida it is not recommended to purchase trees without varietal names for reasons discussed in this article. When retired from fruit production date palms are used for ornamental purposes. "Zahidi," "Deglet Noor," and "Medjool" are popular commercial varieties in the United States. These popular commercial varieties are grown in large quantities and upon retiring these trees the excessive stock floods the landscape markets. I believe more resistant cultivars are not offered as frequently in Florida, because they are not as widely planted commercially. Fruit from the less frequently cultivated varieties are not necessarily inferior in taste and



2. "Medjool" variety in Orlando displaying "feather duster" crown.

in some cases are better than the popular commercial varieties. A limiting factor preventing wider cultivation could be perishability, making them difficult to get to market. Of these three varieties "Medjool" is most resistant to rain and humidity. "Zahidi" and "Deglet Noor" are probably better suited to arid regions and more resistant varieties should be sent to rainy, humid regions such as Florida. It is hoped with this information, varieties with foliage more resistant to *Graphiola* and/or fruit that is tolerant of humidity and rain will be imported to Florida for possibly edible fruit and a more ornamental appearance. At this writing I have a "Medjool," "Dayri," "Thoory," "Hal-awy," "Amir Hajj," and "Barhee." I will observe how each cultivar responds to *Graphiola* on the foliage and rain and humidity on the fruit. Under Florida conditions these cultivars, in my estimation, show the most promise for either edible fruit or a more ornamental appearance or both. There are several other varieties that fared well with respect to rain and humidity in other studies but

are not available in the United States and have probably never been imported here. If others have observations of *P. dactylifera* in humid and rainy climates please contact me.

Acknowledgments

USDA Agriculture Research Station National Germplasm Repository for Citrus and Dates Riverside, California for providing "Amir Hajj," "Barhee," and "Thoory" offshoots. Thanks to Tim Williams, Chris Corbett, and Polly Balance for their professional help and advice.

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BOOK REVIEW—CHAMAEDOREA PALMS

Piet Vorster, Botany Department, University of Stellenbosch

Personally I have never liked *Chamaedorea*. For me the charm of palms lies in their majestic dimensions and bearing, properties which are conspicuously absent in *Chamaedorea*. Added to this is the plebeian presence of *Chamaedorea elegans* in every super-market and reception room. Yet this magnificent book completely changed my mind, to the extent that I am now determined to grow as many species of *Chamaedorea* as I can. Dear Reader, there are species more beautiful than you can ever imagine, such as *C. amabilis*, *C. deneversiana*, *C. lucidifrons*, *C. palmeriana*, *C. stricta*, *C. tenella*, *C. tenerrima*, *C. tuerckheimii* . . . the list is endless. All these are very different from *C. elegans* and indeed often look very unpalmlike. Then there is the magnificent *C. tepe-jilote* which grows as tall as 7 meters.

Essentially this book is a monograph. Each species, of which quite a number were discovered and first described by the author, is treated comprehensively with regard to bibliography, typification, nomenclature, geographical distribution, and general discussion, and there are comprehensive descriptions and

at least one plate of stunningly beautiful color photographs depicting habit (usually in nature), flowers, and fruit. This book is living proof that a scientific work need not be inaccessible to the layman, as it is written and presented in a most attractive and user friendly way.

Background chapters treat scientific concepts such as priority in nomenclature, typification, the species concept, history (with beautiful reproductions of old illustrations), distribution and ecology, economic uses, conservation, culture including nutrition, a glossary and a bibliography. There is also an identification key which, a prominent palm taxonomist told me, does not work all that well.

Lastly, practically all species are not only cold hardy, but grow well under less than tropical conditions; and favor shady situations where so few other palms thrive.

I unhesitatingly recommend this lovely book not only to *Chamaedorea* enthusiasts, but to all interested in beautiful plants.

BOOK REVIEW—Courtesy of *The Palm Enthusiast* (journal of the South African Palm Society)

The Coconut Palm in East Africa

2. The Pemba Dwarf in Zanzibar

E. KRAIN, J. A. ISSA, A. KULLAYA, AND H. C. HARRIES

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Occurrence of the Pemba Dwarf

In East Africa, coconuts grow predominantly along the shores and islands of the Indian Ocean. They occur in a narrow coastal belt from Somalia, through Kenya, widening to about 150 km in Tanzania and more in Mozambique until the southerly limit of the Tropic of Cancer is reached. Further inland, coconut palms grow along the shores of Lake Nyasa and Lake Victoria and at places like Mbeya and Tabora.

The Pemba Dwarf occurs everywhere along the Tanzanian and Kenyan coastal coconut growing area. Especially, many grow in Zanzibar, and again many more in Pemba (Zanzibar proper comprises the islands of Unguja, commonly called Zanzibar, and Pemba). Introduced dwarf varieties also occur, for instance the yellow, red, and green forms of the Malayan Dwarf. In Zanzibar, some may have been imported earlier, but many can be traced to one major importation under the Ministry of Agriculture in the 1950s and successive plantings (Herz-Schweizer 1986) as well as from recent introductions, largely from the Ivory Coast, made by the National Coconut Development Programme. These included the Malayan Dwarf forms, the Cameroon Red Dwarf, as well as tall varieties and dwarf x tall hybrids. The originals are located on NCDP breeding sites and their progenies on farmers' land.

It seems that Pemba has been the primary source of local dwarf palms for the coast of Tanzania and Kenya. This is clearly reflected in the name of the dwarf, which is "Kipemba" everywhere except in Zanzibar (Unguja) and Pemba where it is called "Kitamli." On Zanzibar the name "Kipemba" may be applied to another type of coconut which is a yellow colored tall, rather than a red colored dwarf (see below). Color and plant habit are frequently used to identify coconut varieties. These are usually subjective descriptions, not based on any measured or standardized criteria.

The large number of local dwarf palms in Zan-

zibar could be due to the location of the original introduction and the greater agricultural and economic importance of coconuts there. The climate and growing conditions of the islands, particularly Pemba, are also more suitable for coconut cultivation than on the mainland.

Names for Coconut Palms in Zanzibar

People in Zanzibar distinguish between local tall palms ("mnazi mrefu") and dwarf palms ("mnazi mfupi"). The tall are often further differentiated according to the color of the nut into: "mnazi mweusi" (the green coconut, although mweusi literally means black), the "mnazi mwekundu" (the brown or red coconut), and the "mnazi mweupe" (the white coconut). The "mnazi mweupe" is often also called "kipemba" or the "mnazi wa Pemba," but this only in Zanzibar. There are persistent reports that a King Coconut variety occurs in Zanzibar (see below) and that it is supposedly either identical, or looks similar, to the "mnazi mweupe."

The Pemba Dwarf is called "Kitamli" in Zanzibar and "Kipemba" on the Tanzanian mainland.

The terms "Mnazi wa Unguja" or "Mnazi wa Bahari," as mentioned by Voeltzkow (1920), or "African Nut" and "Indian Nut," mentioned by Craster (1913), are not in current use.

History of Dwarf Coconuts in Zanzibar

Coconut palms are likely to have been cultivated for thousands of years in these same coastal regions of East Africa (Schuiling and Harries 1992). The earliest written source, dating back to the first century AD (Sheriff, 1981, p. 565), mentions coconuts (or coconut oil) being traded from Raphta, an ancient town at the mouth of the Pangani River on the coast of northeast Tanzania.

Coconut palms are mentioned by later travellers to the east coast of Africa, but few mention any dwarf coconut palms specifically. Attempts to find historical evidence has yielded the following:

Baumann, a geographer, reported that coconuts were perhaps introduced by the Wadebuli from Dabnal, formerly Dabul, a port on the west coast of India (Baumann 1896). Dabul was a trading center from the 10th to 16th centuries, connecting Persia, the Red Sea, and the coast of East Africa (Mohammed 1986). Writing at a time when copra had recently become the most important product of the palm, Baumann discounted the Pemba dwarf, saying, "This variety has no value as a copra palm . . . and is cultivated for drinking nut production only" (Baumann 1896, p. 17). Baumann also reported that he had seen the Pemba coconut palms in Mafia (Baumann 1897). Baumann summarized his findings:

"The coconut palm is planted in large numbers and provides a high yield of copra. There is one special variety on Pemba, which has been disseminated from this island to Zanzibar and the mainland, it is called 'Nazi ya Pemba' a short variety with short leaves and yellow-red nuts containing a very delicious juice" (Baumann 1899, p. 12).

Craster, a land surveyor on service in Pemba, recorded that "The natives recognize three different kinds of coconut: the Pemba nut, the African nut, and the Indian nut. The Pemba coconut palm grows to a height of sixty or eighty feet, and bears nuts with light brown, oblong-shaped husks. The African palm grows to one hundred feet or more, and the nuts have very thick, green, oblong-shaped husks. The kernel and milk of the African nut are not so sweet as those of the other two. The Indian palm does not grow as tall as the others, and begins to bear much earlier—after about six years: the husk of the nut is round in shape, yellow and thin, and the kernel is very sweet" (Craster 1913).

Voeltzkow, a botanist and zoologist, stated that "The natives differentiate between three different types of coconut palm; the common Zanzibar Palm, 'Mnazi wa Unguja', with bright yellow inflorescences and nuts of the same colour; the 'Mnazi wa Bahari' (the sea palm) with very big green nuts and inflorescences, and finally the 'Mnazi wa Pemba' which can be recognized by its short growth, the very yellow midribs of the leaves, many dark yellow inflorescences with egg-shaped beautiful orange-yellow nuts, which very often mature only three to four meters from the ground. This type is often cultivated near the homes and

along the roads. It bears nuts after only five years, but which normally are only used as drinking nuts. This type can be found not only in Pemba but also in Zanzibar (Unguja) and along the coast. Occasionally it is also called 'Indian Coconut' and might perhaps, as Stuhlmann (1909) thinks, be identical with a variety grown in Ceylon which is called 'Tembili' or 'King Coconut'. Also according to Stuhlmann there is a special dwarf type which is called 'Mnazi wa Kitamli'" (Voeltzkow (1920).

Pearce, who was British Resident to Zanzibar considered that "There are two varieties of coconut palms grown in Zanzibar. The first is the ordinary species, while the second is a diminutive variety known as the Pemba coco-nut. This latter palm is very much smaller than the ordinary species, and with its clusters of gold-coloured nuts has a most pleasing and graceful appearance. It is planted to mark boundaries, and its milk is esteemed for drinking" (Pearce 1920).

Williams, Director of Agriculture, Zanzibar illustrated his book on the useful and ornamental plants of Zanzibar and Pemba with a photograph of local tall and dwarf coconut palms. From the picture, the dwarf can clearly be identified as a Pemba Dwarf (Williams 1949).

None of the above authors were coconut specialists so their unbiased descriptions are very helpful but have to be used with some care. There are some apparent contradictions which will be dealt with in discussion.

Contemporary Sources

Herz-Schweizer assumed that the local dwarf "arrived during the increased trade movements between Zanzibar and India, Sri Lanka and the Far East—after the Oman Arabs declared Zanzibar a Sultanate of their own in 1848" (Herz-Schweizer 1986, p. 4) but did not provide any supporting reference. She described the Pemba Dwarf as closely resembling the Cameroon Red Dwarf (Herz-Schweizer 1986, p. 6). According to recent observations in the Pemba Dwarf germplasm plot at Selem, the resemblance between the two can be confirmed for most of the palms. Nevertheless there are about 5–10 percent which look quite different and more like the Malayan Dwarf (Krain and Issa 1991). It is also interesting to note one quotation of Herz-Schweizer's report "In the very variable EAT [East African Tall] population, a few palms can be found with light yellow fruit colour (Kipemba or Kineupe) and a few palms with red fruit colour. The nuts are pear-shaped

and small, the growth in height of the palm is slower than others. It could be that this palm is a King Coconut" (Herz-Schweizer 1986, p. 2).

Until recently it was thought that the word "Kitamli" had no particular meaning, other than just being a name for the local coconut variety. However, in a personal communication Ghassan conjectured that the word "tamli" is a corruption of "tambili," having learned from Mr. R. K. Trimlet, senior agricultural officer in the colonial service, Zanzibar, that "tamli" was a word coming from Sri Lanka (Ceylon) and that the 'King Coconut' (Tambili in Sinhalese) is a distinct variety. The King Coconut is said "to have originated in Ceylon, bearing a yellow, ovoid fruit, distinguished by its sweet juice and esteemed for culinary purposes, but it is of little commercial value for copra" (MacMillan 1934, p. 376). This identification, which may be based on Stuhlmann (1909), matches that of Voeltzkow (1920) and is supported by Jacob (personal communication) on the basis of visual observations in Sri Lanka and Zanzibar.

According to Purseglove (1972, p. 452) the "King Coconut" of Sri Lanka is known as "Rath Thembili," *Cocos nucifera* var. *aurantiaca*, a semi-tall cultivar described as "late flowering, self-pollinating, heavy-setting, with fruits of medium size, but little endosperm, and of little use for copra, but providing a popular drinking nut in India and Sri Lanka."

On Pemba there is a village with the name Mtambile. However, inquiries there did not yield a connection between "tambili" and "Mtambile."

Recent efforts to locate specimen palms of the "King Coconut" on Zanzibar did not result in clear-cut success. The examples found were not really convincing. They could have been yellow-fruited tall or hybrid varieties.

Discussion and Conclusions

The most important local palm variety is the East African Tall. It is a variety which is indigenous to East Africa for some thousands of years (Schuiling and Harries 1992). This variety is called in Kiswahili "Mnazi Mrefu." According to its color it includes "Mnazi Mweusi," "Mnazi Mwekundu" and perhaps most of those called "Mnazi Mweupe." It is assumed that it is the same as "Mnazi wa Unguja" and "Mnazi wa Bahari" by Voeltzkow and "African Nut" by Craster.

At first sight, it appears to be difficult to reach a conclusion about the Pemba Dwarf. Baumann

describes the "Nazi ya Pemba" as a dwarf, Voltzkow describes the "Mnazi wa Pemba" also as a dwarf, but says that there is another dwarf variety called "Mnazi wa Kitamli" ("Kitamli" would be understood as the Pemba Dwarf today), Craster describes the "Indian Palm" as the shortest and the "Pemba Cocoa Nut Palm" as in between it and the typical tall "African Nut." Pearce only describes two local varieties and so does Williams. From their descriptions the local dwarf seems to be identical with the Pemba Dwarf. According to Herz-Schweizer's description the "Kipemba" is a bit shorter than the tall and the Pemba Dwarf is rather similar to the Cameroon Red Dwarf. The King Coconut has apparently been absorbed into the local palm population to such an extent that it is no longer possible to clearly identify individual palms. However, the clue may lie in the name, if this is a transliteration from Indonesian "kalapa raja" or royal coconut. A variety of that name, with a description matching the King Coconut, the Thembili or the "kitamli," has been known for at least 250 years (Rumphius 1740; Ohler et al., in preparation).

A "Pemba Coconut" was described from Philippines in 1912 as "a prolific variety, tree comparatively small, husk pale-yellow and thin, kernel of the usual thickness" (Barrett 1912). At time it must have been well established though it is not apparently known today (Santos, personal communication).

There is no specific mention in the literature about an early introduction of dwarf palms to Pemba, but Pemba is well accepted as the place from where dwarf palms were distributed to elsewhere in East Africa.

The close resemblance with the Cameroon Red Dwarf is not likely to be a coincidence. In this case the link appears to be the German colonial period about 100 years ago. Red dwarf coconuts have been found in other territories with a similar colonial history—Papua New Guinea, the Caroline Islands, Samoa, and elsewhere in the Pacific.

Summary

The tall coconut variety is likely to have been on the coasts and offshore islands of East Africa for a thousand years or more. The yellow fruited form, "mnazi mweupe," may be called "kipemba" on Zanzibar but on the mainland the name "kipemba" is used for a red fruited dwarf known as "kitamli" on Zanzibar. The name "King Coco-

nut" is also recorded and, in the absence of any positive identification, has possibly been applied to the "mnazi mweupe" and the "kitamli" types.

A likely explanation is that the King Coconut or Rath Thembili was introduced to Pemba as the "Tambili" (from either Sri Lanka or India) and the name became corrupted to "kitamli." When taken from Pemba to Unguja (Zanzibar) that name was retained but on the mainland the name "kipemba" was adopted. The introduction may have been comparatively recent, maybe 150 to 250 years ago, and from India since the name "Indian Coconut" is still well established in the source references and in the memories of a few people. Once established in Pemba it then became a source for other parts of East Africa.

A red dwarf coconut that has been identified in countries in West Africa and the Pacific could share similar origins. One hundred years ago, under colonial influence, these could even have originated from Pemba, in which case, the recent introduction of Cameroon Dwarf to Tanzania might be a reintroduction.

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The Distribution and Characteristics of Louisiana Petrified Palmwood

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ABSTRACT

The color variations and vascular bundle characteristics were examined from 72 different specimens of Louisiana petrified palmwood. While all specimens studied had consistent vascular bundle structure, no relationship was found between the vessel diameter and stem size. Vascular bundles do not decrease in size near the periphery of stems. The color variation and range of color in the well-silicified stem specimens was incredible. The age of the palmwood was established as late Oligocene to early Miocene. Vascular bundle and stem characteristics of the fossil palms appear to be similar to extant Phoenicoid palms.

Searching for new fossil palm specimens is a very satisfying recreational activity. Locating such specimens is now a real challenge as most of the surface specimens have long since been found. Some of the best localities for collecting are "posted" and are unavailable for scientific study. Finding a well-silicified specimen with unusual colorations or patterns is the ultimate dream of a fossil palm collector. Usually the exterior surface of a chunk of fossil palm is well oxidized and must be sliced with a lapidary diamond saw before its quality and color are known. The vascular bundle patterns present in fossil palmwood have always fascinated me. So it was quite natural to finally study the palmwood more closely.

The fossil record for many palms (including those found along the Gulf Coast) has been described (Uhl and Dransfield 1987, Tuta 1967). Vascular bundle characteristics are well documented (Tomlinson 1961). Other observations on the vessels in palms have been made (Klotz 1978).

Materials and Methods

Although specimens were observed and collected in a number of parishes in Central and North Louisiana, only the specimens from Natchitoches

and Rapides Parishes were used in this study as the structure of palm stems in these locations was very well preserved by a complete impregnation of colored silicas during the fossilization process.

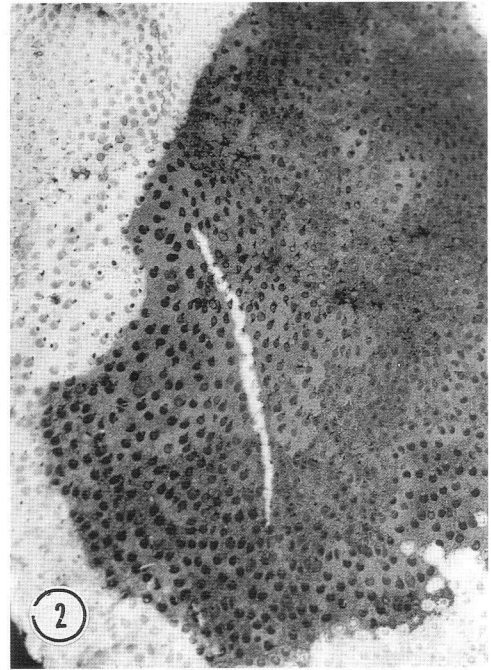
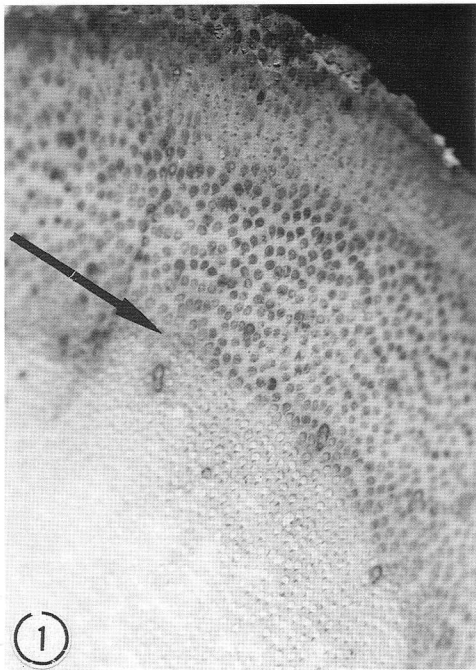
Specimens were sliced using a Lortone lapidary saw with an 18" Vanguard diamond blade. This sectioning was at right angles to the vessels in each section of the palmwood. This exposed the vascular bundles in cross-section and allowed for consistency in describing the sizes and characteristics of those bundles. A comparator and metric reticle were purchased from Edmund Scientific that were used to measure the sizes of the vascular bundles. Vascular bundles were measured by moving the reticle over a slice of the palmwood until one of the metric circles exactly circumscribed an entire vascular bundle. Vessel diameter has been established as a significant criterion in the study of palms (Klotz 1978a, b).

I originally intended to record the color variations in the palmwood using the color scheme developed by the U.S. Geological Survey. A new plan was developed due to the almost unlimited range of coloration found. Color sample cards were acquired in sequence for all of the major paint companies. After comparing these sample colors with the colors in palmwood slices, only the Pratt and Lambert paint sequence matched the entire range of coloration found in the fossil palm stems. A color match was attained by holding the paint sample cards directly on the palmwood slices. When three of us agreed on a color match, it was recorded.

Results and Discussion

A total of 72 specimens were examined. Although a total of 278 colors were found in these specimens, only 150 different colors were identified overall. These colors were later grouped into 8 categories to simplify the results: 1—Blacks and grays, 2—White and variations of white, 3—Blues and greens, 4—True browns, 5—Beige to

¹ This research was funded by the Shearman Research Initiative Fund, McNeese State University.



1. Vascular bundles are well defined. Phloem is usually light in color (especially in the central cylinder) and is positioned toward the stem periphery. Xylem appears quite dark (usually as a small dot facing the core of the stem). The arrow marks the usual abrupt transition between the central cylinder and the cortex. Vascular bundles in this specimen measured 1.0 mm in diameter. 2. Note the contrast in coloration. Zones of color often have no relationship to stem structure or location along the stem. Vascular bundles in this specimen measured 1.0 mm in diameter.

tan-browns, 6—Brownish grays, 7—Dark reddish browns, 8—Pink to light purple.

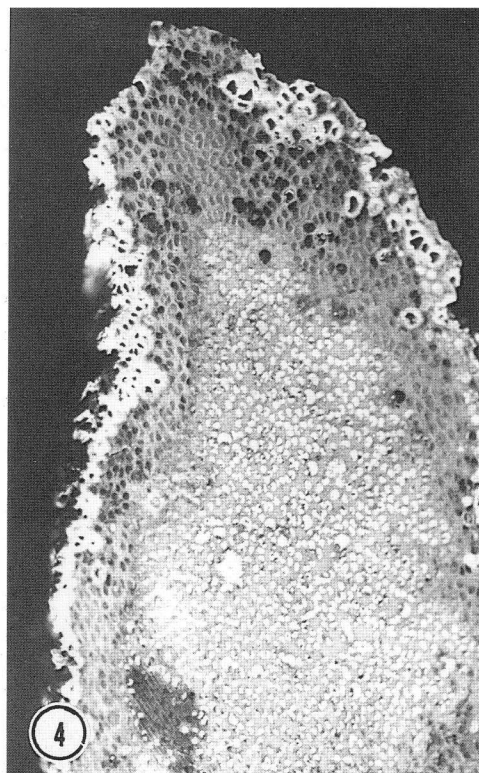
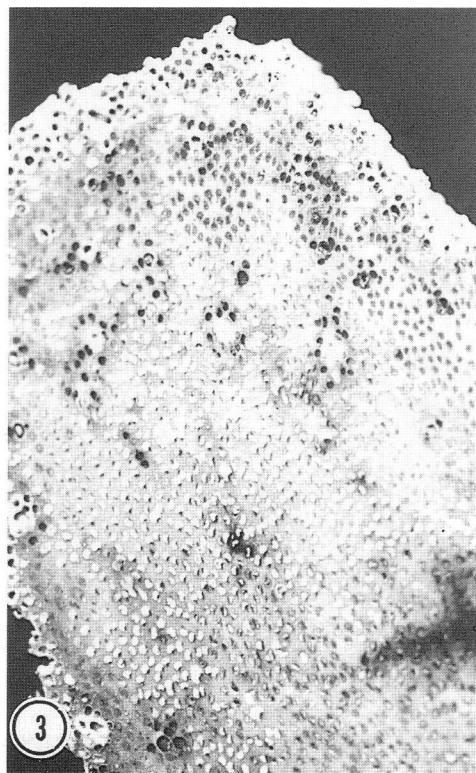
The petrified palms of Central Louisiana were solitary, moderately tall, mostly between 6 and 20 feet. Several specimens have been found (in broken sections) which were later assembled into complete stem reconstructions. The stems of petrified palms found in Northwest Rapides Parish

and Southeast Natchitoches Parish are well silicified thereby preserving the stem structure (i.e., individual vascular bundles) in superb detail. Unfortunately, no petrified fruits, fronds, etc. of the fossil palms have been located. Only the stems are available for study.

Although it is difficult to relate a fossil palm to a modern genus (Uhl and Dransfield 1987), I have attempted to do just that. Identification is based exclusively on preserved stem structure. Vascular bundle characteristics were compared to extant species (Tomlinson 1961) in the attempt to identify the possible genus of the extinct palms. The specimens collected have a narrow cortex which is usually of a different coloration from the central cylinder. Vascular bundles have a consistent orientation with an inner, single xylem strand surrounded by parenchyma and an outer, individual phloem component which is covered by a fibrous sheath (not always visible). The vascular bundles are uniformly scattered throughout the cortex and central cylinder, but are congested at the outer edge of the central cylinder. The diameters of

Table 1. Summary of the colors found in the palmwood.

Color Category	# Different Colors in Each Category	# Colors Identified in Each Category	Percentage of Identified Colors Found
1	28	46	16.55%
2	15	22	7.91%
3	8	35	12.59%
4	18	35	12.59%
5	49	82	29.50%
6	12	27	9.71%
7	7	16	5.76%
8	13	15	5.40%



3. An unusual section of a palm stem where the vascular bundles exhibited a wide range of coloration. Vascular bundles in this specimen measured at 0.7 mm in diameter. 4. An example of the occasional variation in vascular bundle shapes: central cylinder bundles are oval to round while those of the cortex have a fusiform shape. Note the holes along the periphery of the cortex. These indicate areas of poor preservation. Vascular bundles in this specimen measured 0.7 mm in diameter.

individual bundles ranged from 0.2 mm to 2.0 mm. Individual xylem diameters ranged from 0.05 to 1.25 mm. Vascular bundles are very consistent in diameter and structure throughout the length of a stem. The size of the bundles is not related to the diameter of the palm nor do the vessels decrease in size near the periphery of a stem. However, while most vascular bundles are very round, a few vascular bundles toward the periphery tend to be more elongate to fusiform in shape. The ground parenchyma is uniform in texture, typically with concentric color variations across the stems; random color alteration is not uncommon.

These characteristics are more similar to the extant Genus *Phoenix* than to other genera. It is therefore possible the extinct Louisiana petrified palms were the predecessors of the *Phoenixoid* palms of today.

Fossil palms have been located along the Gulf Coast in ages ranging from Eocene to Miocene (Tuta 1967). Most of the specimens collected in this study were located in sediments of the Carnahan Bayou Member of the Fleming Formation (early Miocene) and Catahoula Formation (late Oligocene). This indicates a probable age of the specimens at around 30 million years old. It is interesting that local residents insist the specimens are 60 million years old.

Acknowledgments

I especially want to thank Dr. Natalie W. Uhl for answering my many questions during this project and my two student associates, Mr. Todd Honeycutt and Mr. Richard Martinez for the long hours they spent in the laboratory helping gather and record the data reported in this paper.

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WHAT'S IN A NAME?

Lemurophoenix (lee mure oh fee nix)—a compound of lemur, the endemic Madagascar primate group, and *phoenix* (Gr.), the date palm and used as a general name for a palm; a partial translation of the Malagasy vernacular name for this splendid palm “hovitra vari mena,” the palm of the red-ruffed lemur.

Acanthophoenix (a kan though fee nix)—a compound of *acanthos* (Gr.), a spine, and *phoenix* (Gr.), the date palm, also used as a general term for a palm. The name reflects the very spiny nature of this Mascarene genus.

Borassus (bor ass us), said to be from borassos (Gr.), an immature inflorescence of the date palm *Phoenix*, though why Linnaeus should have used this word for a completely different palm is not clear.

Borassodendron (bor ass oh den dron), a compound of *Borassus* (see above) and dendron (Gr.), a tree.

Calamosagus (kah lam oh say gus), combines two generic names, *Calamus* and *Sagus*. We assume that the name, a synonym of *Korthalsia*, reflects the climbing, *Calamus*-like habit of this rattan genus and the inflorescence branches that bear a strong resemblance to those of the sago palm *Metroxylon* (to which at one time the generic name *Sagus* was applied).

Calappa (kah lap a), an early synonym of *Cocos*, the coconut, is a latinisation of *kelapa*, one of the most widely used vernacular names of the coconut in Malaysia and Indonesia.

Sagus (say gus), latinisation of the Indonesian/Malay word *sagu*, from which the English “sago” is also derived; this is a synonym of *Metroxylon*, the sago palms. Sago is extracted from the pith of the stem.

Marojejya (mah roh zhay zhee a) is named for the extraordinary rugged mountain massif of Marojejy in northeastern Madagascar where the palm was first collected by Humbert.

Masoala (mah zoh ah la) is the rugged peninsula in northeastern Madagascar where the eponymous genus was first collected by Perrier de la Bâthie.

Voanioala (voh ah nee oh al a) is the Malagasy name for this relative of the coconut. The name means, literally, fruit of the coconut of the forest, or forest coconut. It illustrates the remarkable connections between Malagasy and the Malay languages of southeast Asia, reflecting the early colonization of Madagascar by peoples of southeast Asian origin. *Voanioala* is linguistically very close to *buah niur ala* which would be recognisable in Java as “fruit of the coconut of the forest.”

JOHN DRANSFIELD

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Ecology and Uses of *Parajubaea torallyi* in Bolivia

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In the Province of Vallegrande, Department of Santa Cruz, Bolivia, grows a little known palm, *Parajubaea torallyi* (Mart.) Burret, called "palma de zunkha," (also spelled "zunca"), pronounced "soon kah", which in Quechua means "beard" and refers to the petiole fibers. Quechua, the official language of the Inca Empire, is spoken from northern Argentina to southern Colombia; it is one of the main languages of Bolivia.

The "zunkha" is a very important plant for the peasants who have utilized it for centuries, but irrational exploitation is putting it in danger of extinction as it is rare within its restricted native range.

Origin and Botany

Moraes and Henderson (1990) summarized the taxonomic data on *Parajubaea torallyi* and the possibly conspecific *P. cocoides* Burret of Colombia and Ecuador, but very little has been published on the ecology or uses. Cardenas (1970) gave a description of this palm in the Department of Chuquisaca, where it is called "janchi coco," referring to the tough fibrous material ("janchi," Quechua) left when the endosperm ("coco," Spanish) is eaten. Cardenas was familiar with the palm; when the Botanical Garden in Cochabamba was being developed and some native trees were being sought for the principal avenue of the garden, seeds of *P. torallyi* were brought from Chuquisaca. These trees have grown well, but have not flowered; in December, 1990, they were suffering from the severe drought in the Cochabamba valley. By 1993 some had begun to flower. Cárdenas also visited the palm stands of Chuquisaca (Soroma and Pasopaya) and saw some plants cultivated at the monastery of Santa Teresa in Cochabamba and in the central park of the Jesuit College of the Sacred Heart in Sucre; however, the origin and age of the palms were not known.

In Cardenas' important treatise on the useful plants of Bolivia (Cardenas 1989), *Parajubaea*

torallyi is again mentioned, but apparently the author was unaware of another major use of the palm—for the fibers. A native of the town of Vallegrande, Rafael Peña (1822–1901) does not mention the edible fruits but refers to the use of the strong fibers of the "palmera zunca" for ropes, baskets, brooms, and coarse cloth in his *Flora Crucena* (Peña 1976: 292–293), first published in 1901. Uses are also listed in Balslev and Moraes (1989), based on recent information from the Vallegrande area.

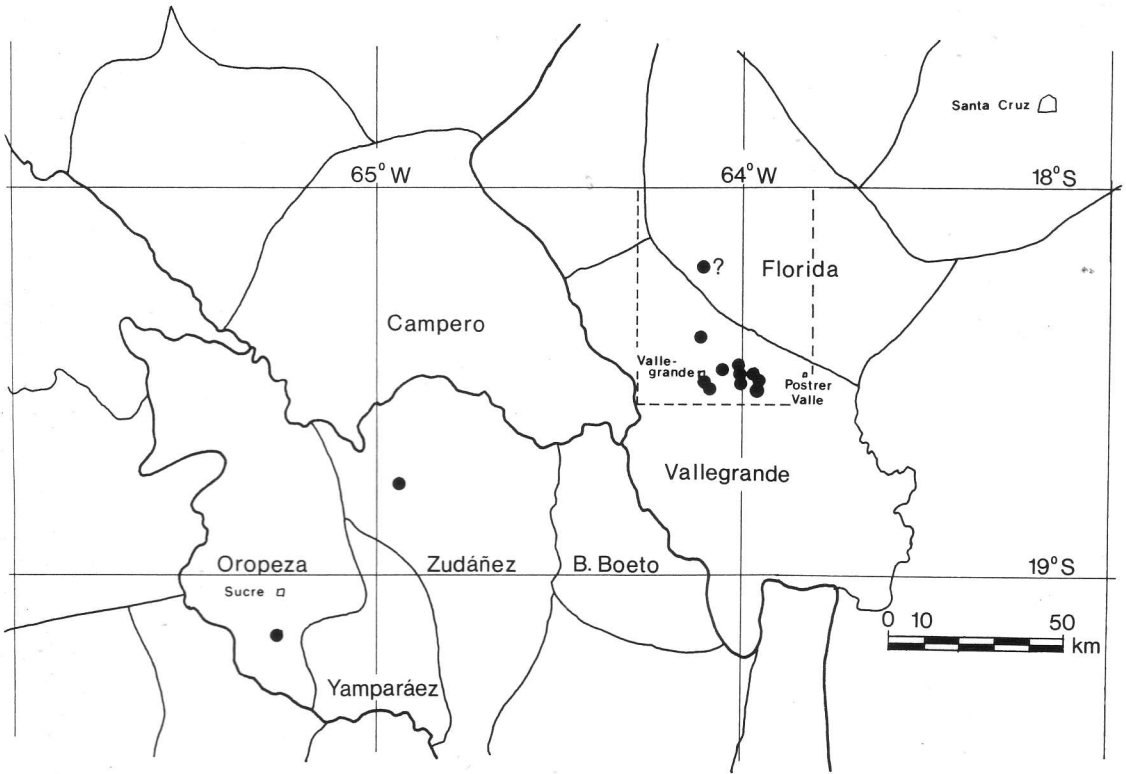
Distribution and Ecology

This palm is restricted to the northern Department of Chuquisaca (Provinces of Oropeza and Zudáñez) and the western Department of Santa Cruz (Province of Vallegrande and possibly Province of Florida). It is possible that it occurs in the Department of Cochabamba (Province of Campero) and south of the localities shown in Figure 1, but there is little likelihood that it occurs further west, north, or east because suitable habitats are lacking.

Parajubaea torallyi is endemic to south-central Bolivia at altitudes from 1,800 to 2,500 meters, where it inhabits the dry temperate forests. The dry season lasts from June through October and often longer. In July and August frosts often occur at night. *P. torallyi* should prove to be one of the more frost-resistant palms, at least in dry climates; it would probably be well adapted to mediterranean localities. Seeds from Vallegrande are being provided to the International Palm Society's Seed Bank.

The known localities in the Vallegrande region are numbered as in Figure 2. Most of the localities consist of a very few cultivated trees, and most of the wild populations are small or severely endangered.

1. *Quebrada del Zorro*. 18°30'S, 64°06'W, alt. 2,040 m. M. Nee & I. Vargas 38349 (K, LPB,



1. Known distribution (solid dots) of *Parajubaea torallyi* in Department Chuquisaca (Provinces of Oropeza and Zudáñez) and Department Santa Cruz (Provinces of Vallegrande and Florida). Area in dotted lines enlarged in Fig. 2.

NY, MO), *I. Vargas 101* (LPB, USZ, Jard. Bot. Santa Cruz).

The "quebrada" is a small stream valley with a recently abandoned farmhouse. There are three large "zunkha" palms over 100 years old, and another recently fell down. In a thicket of the giant reed *Arundo donax* L. there is abundant regeneration of the palm where the seedlings are protected from fires and grazing by cattle. It is reassuring to see the vigorous regeneration if these precautions are taken. A young tree on the other side of the stream is shown in the cover photograph.

About 100 meters to the south there are three large trees, over 100 years old in a brushy pasture on a gentle slope. A fourth one was cut down a few years ago to make a telephone pole. No illustration is provided here.

2. *San Antonio, on road from Vallegrande to Guadalupe. 18°30'S, 64°06'W, alt. 2,040 m.*

There are two very large and one smaller tree east of the road and one west of the road. These are cultivated trees, but there is some regeneration

in the orchards and gardens. There may be three more trees east of the road in a ravine.

3. *Guadalupe. 18°33'S, 64°05'W, alt. 2,000 m.*

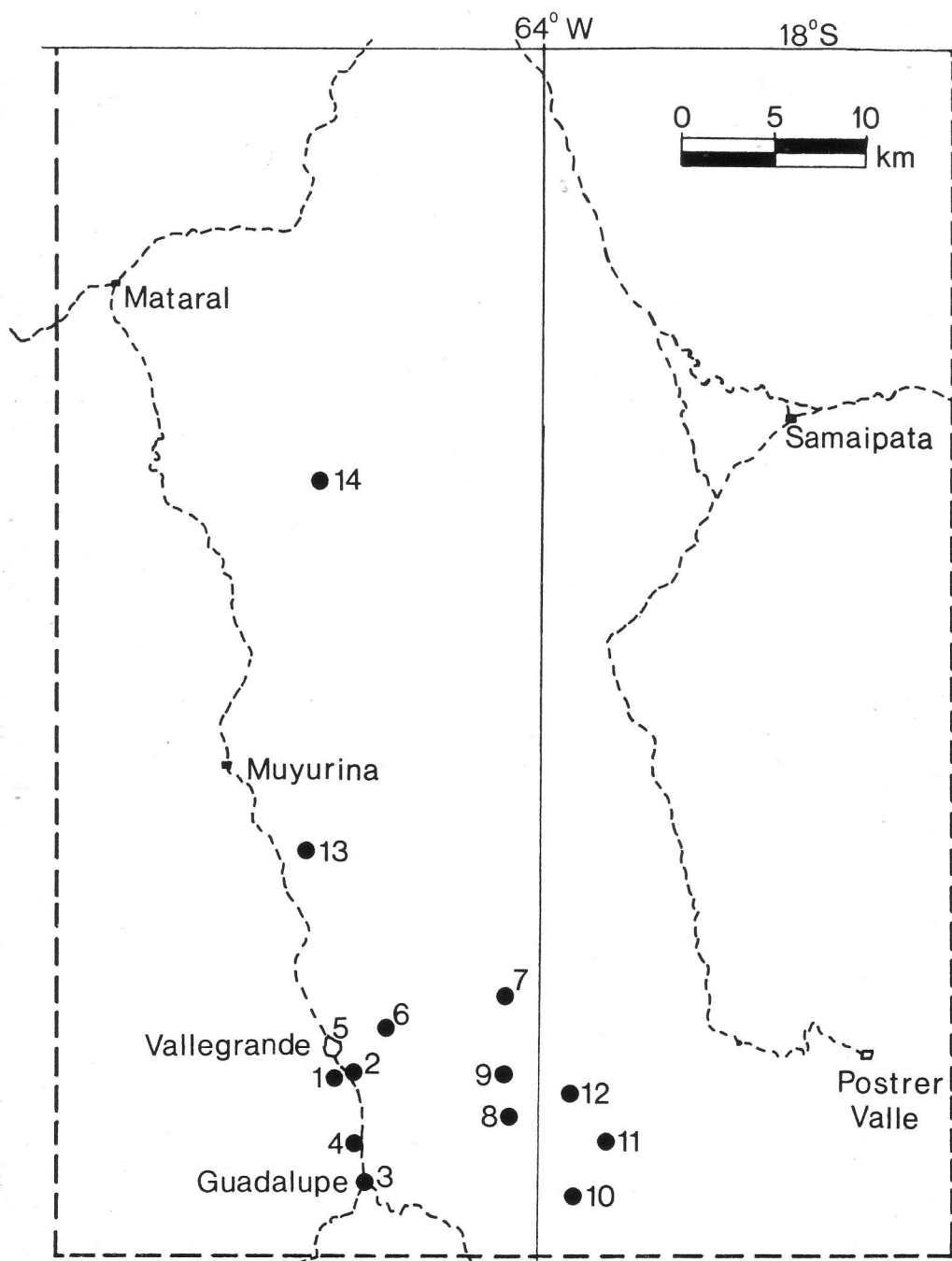
There are three large cultivated trees here which were said to be brought many years ago from trees to the west (upstream from) locality 1.

4. *Quebrada Huasacana. 18°32'S, 64°06'W Cañada alt. 2,050 m.*

There is a cultivated tree, about 15 years old, brought from San Blas (localities 7, 8, and 9) and another small tree brought from upstream from locality 1.

5. *Vallegrande. 18°29'S, 64°06'W, alt. 2,000 m. M. Nee et al. 36245 (AAU, Jard. Bot. Santa Cruz, K, MO, NY).*

This single young tree flowers and fruits abundantly. It grew spontaneously in about 1974 from discarded seeds which had been brought into the town for eating. It is very healthy, growing in the backyard of a house, in an area now used for domestic animals. There are a few other young trees in Vallegrande, also having sprouted from discarded seeds.



2. Locations of *Parajubaea torallyi* in the Vallegrande region. Numbers as in text.

This collection and the previous ones are from the broad semi-arid valley of Vallegrande. The “zunkha” palm may never have had natural populations here, for the trees are either cultivated or probably so. The following collections are from natural populations.

6. *Cañada Arteaga*, 3 km NE of Vallegrande. $18^{\circ}28'S$, $64^{\circ}05'W$, alt. 1,960 m.

According to one informant, in the *Cañada de Arteaga*, there was formerly a palm grove, but today there are only two very tall plants. This “cañada” (ravine) was formerly called San Jose

de las Palmas, then later called Canada de Vargas, and nowadays it is known as Canada de Arteaga, these latter two based on surnames of local people.

7. *Rio San Blas*. 18°S, 64°01'W, alt. 1,850–2,000 m.

The palm is very rare on the west side of the river (only two trees), but there are many small plants on the east side. "Corocera" is the name given here to the palms that produce fruits ("corozo" is the name for the fruit), but they have all been cut down and there is only a single large palm left.

8. *Rio San Blas—Rio Rodeo*. 18°31'S, 64°01'W, alt. 1,800–1,900 m.

There are only small trees in this population.

9. 18°30'S, ca. 64°00'W, alt. 1,800–1,900 m.

There are many trees in the quebradas here.

10. *Rio Piraymirí*. 18°33'S, 63°59'W alt. 1,800 m. M. Nee et al. 36179 (AAU, LPB, Jard. Bot. Santa Cruz, MO, NY, US).

There are only ten young trees in a steep valley, 1 km upstream from Juntas de Guaricongas.

11. *Mataralcito*. 18°32'30"S, 63°57'30"W, alt. 2,150 m. A. Henderson et al. 760 (LPB, NY, USZ), M. Moraes et al. 1,048 (LPB, NY, USZ), I. Vargas 230 (LPB, USZ, Jard. Bot. Santa Cruz).

This population includes a number of larger trees which have footholds carved in the trunks so that the "zunkha" fibers can be harvested without felling the tree. Petioles up to the flowering nodes are harvested so no fruits are being formed. No regeneration was seen here although the conditions are probably favorable. The habitat here is much wetter than the previous locations and the degraded forest includes *Podocarpus parlatorei* Pilger, *Cedrela odorata* L. and *Tipuana tipu* (Benth.) Kuntze.

12. *Alto El Palmar*. 18°31'S, 63°59'W, alt. ca. 1,900–2,000 m.

There are said to be many "zunkha" palms in this area and they have probably been exploited for more than a century.

13. *Abra Quina-Quina*. 18°25'S, 64°07'W, alt. 1,850–1,950 m.

These are scattered trees in this steep canyon and some regeneration. There are said to be both *Parajubaea* and *Ceroxylon* at a locality called "Palmas Amarillas" two km east of here.

14. *Quebrada La Palma*. 18°13'S, 64°08'W, alt. ca. 1,700–1,800 m.

There are said to be "zunkha" palms at this locality.

Numerous localities in the Vallegrande area

have "palma" or "palmera" in the name indicating the presence of some palm. Some areas probably contain or have contained *Parajubaea*, while others probably have a species of *Ceroxylon* (not identified in Balslev and Moraes 1989) which grows in cloud forests on the ridges in this region.

Method of Propagation

The fruits of *Parajubaea torallyi* fall to the ground at maturity and are transported by animals or water in the vicinity of the plant, where many of them germinate. It is also common to see palms growing on slopes and even on the tops of the hills or cliffs, where neither wind nor water could have carried them. The local peasants believe that these palms come from nowhere, that they are born from the ground itself. We have observed that rats and squirrels like to eat the fruits of this palm; they may be the disseminators of the seeds, carrying them to their holes or nests where they later germinate. Germination requires about 17 months. People who have tried to transplant these palms have not had success.

Form of Exploitation

The "palma de zunkha" has four parts that are exploited. The fiber and leaf products are seen for sale in the Vallegrande marketplace but are not usually exported to the larger cities.

1. The fibers ("zunkha").

The "zunkha" is the fiber of the sheathing petiole base. The fiber can easily be extracted by cutting the base of the petiole and unwrapping the "zunkha." A single petiole produces an interwoven, tough, coarse, light brown fibrous mat measuring more than a meter in length and 50 cm in width at the base (cover photo). The petioles are cut one by one, starting at the lowest and proceeding upwards until the lower living leaves are reached and the fibers become white and are too tender for use. This tree had not been harvested for two or three years, and 37 leaves were removed at once, indicating that about 12 to 18 leaves may be produced each year on a vigorous young tree. Harvesting can be done each year and at any season. Fiber over a few years old on the tree is too weathered or rotten for use, but the fiber can be stored for fifty years if kept inside in a dry place because no insects attack it.

Formerly the "zunkha" was harvested by cutting down the trees, as it is much easier to cut

off the petioles when the tree is on the ground, but little by little extermination threatened the groves. Some people have become aware of this problem and now harvest the leaves by climbing the trees, either by ladders or by cutting footholds into the trunk. Unfortunately, the petioles subtending the flowering and fruiting inflorescences are usually harvested and the intensively exploited trees produce no fruit even though they themselves are not harmed by the harvesting.

a. Ropes ("sogas"). Twisted "zunkha" fiber ropes of different sizes and thicknesses have many uses in the region—to tie up farm animals, to tie gates in pastures—because they are resistant to decay when used outside and are not attacked by insects or gnawing animals.

The rope is made by two people. One person holds the loose end of the growing rope and from a pile of prepared fiber continuously adds small strips 3–4 cm wide by inserting them into the end of the rope with his other hand (Fig. 3). The second person periodically twists the rope by twirling a wooden paddle with a stick through it (the "tarabilla," Fig. 4).

To make a thicker rope, the rope is doubled, the "tarabilla" attached to the doubled end, and the strands are twisted around one another while the second person keeps the loose ends untangled. An additional strand can then be twisted around the other two to make an even thicker rope. Finally, loose projecting fibers are removed with a knife.

b. Mattresses ("colchones"). The "zunkha" fibers are arranged to form a mattress and then tied through with a string of the same fiber. These mattresses are of different sizes and thicknesses and are ideal for sleeping, being cool and very durable.

c. Pads ("capachos"). These are made in the same manner as the mattresses but are smaller and are used on pack animals to avoid injury to their backs when they are carrying irregular loads. Sometimes the pad is covered with a wool bag or sack to keep it from becoming deformed or damaged.

2. The leaves and leaflets.

a. Twine ("kheswa"). This is a small rope twisted from the tough leaflets of mature leaves from the palm. The leaves are removed one day before being worked up so the leaflets become softer and can be twisted more easily. A number of leaflets are torn from the midrib. Two strands are twisted in opposite directions between the open palm and the leg, and then the two strands are



3. Adding "zunkha" fibers to a rope. Senor Bernabe Vargas of Huasacanada, 92 years of age, who has been making "zunkha" fiber ropes for 80 years.

twisted together. Additional leaflets are inserted periodically.

The "kheswa" ropes are very strong, but are smoother and softer than those made from the fibers; they have many uses, such as tying up small farm animals.

They have also been the principal twine used to tie the "canahuca" stems during construction of the roofs of houses, because of their durability and resistance to insect attack. The "cañahuca" (literally "hollow cane") is the useful large Old World grass, *Arundo donax* L., early introduced into the New World and which now grows in dense colonies in many parts of mid-elevation Bolivia. Where available, it is widely used for roofing; the clean dry stems are laid in a single layer above the beams, lashed together by twine, covered by clay, and the roof tiles are then arranged on top.

b. Fans ("phukunas"). Those are used to fan the embers of the kitchen fire. They are made from pieces of the leaf with all the leaflets from



4. Twisting the "zunkha" fibers into a rope with the "tarabilla."

one side bent over and interwoven with those of the opposite side to form a stiff fan. In the Guarani-speaking zone of the eastern and southern Vallegrande region, this same sort of fan made from the leaves of another species of palm ("motacú," *Scheelea princeps* (Mart.) Karst.) is called a "baquitú."

c. *Baskets* ("canastos"). These baskets are made from the several pieces of leaf, with the midrib split and only the leaflets on one side left; these are woven into elegant receptacles which serve for carrying and storing food or different objects. In Guarani this type of basket is called "jasaye" and is made from "motacú" leaves.

3. The kernel ("corozo").

The "zunkha" palm grows very slowly. When it reaches a good size it flowers continuously and produces much fruit. Pollination is by insects.

The fruits are ovoid, 3–5 cm long, and are covered by a yellow, fibrous-corky mesocarp, inside which there is a hard endocarp or "corozo" which contains the sweet, oily, agreeable-tasting whitish endosperm. The fruit falls to the ground when mature and is chewed by cattle and hogs who do not always succeed in breaking the hard stone. Only some rodents such as squirrels and rats are able to break into the stone.

The fruit is much utilized by the peasants who eat the endosperm after breaking the stone on rocks. Some people use the endosperm to make candy or mix it with maize for tortillas. The fruit could very well be used to extract an edible oil, but this is not done at present.

4. The "palmito" and forage.

The "palmito" is the edible tender apical part of the stem and very young leaves; it is very much appreciated. Cattle are very fond of the tender leaflets ("palma vara" or "cogollo"), and browsing retards the growth of the plant. Another destructive practice is to fell trees for the leaves for Palm Sunday processions.

Conclusions

Much research and detailed evaluation of this palm still need to be carried out. Production of the "zunka" fiber and the fruits has not been evaluated, and the economic potential of this palm is not well known.

The University Gabriel Rene Moreno, through the Natural History Museum "Noel Kempff Mercado," is interested in further mapping the distribution of the "zunkha" palm in the Department of Santa Cruz.

We are encouraging the peasants to cultivate the palm as an ornamental plant in farms and gardens, and in the parks, plazas, and streets of Vallegrande and nearby villages. We also are trying to recover and preserve the art of making "sogas," "kheswas," "colchones," "phukunas," "canastos," and other utensils, an art known to very few people in an area where sisal and plastic articles have rapidly replaced the "zunkha" in recent decades. Many people nowadays do not even recognize the palm itself.

Acknowledgments

I would like to thank Dr. Michael Nee of the New York Botanical Garden for translating the

article into English, for help in revision, and for the photographs.

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1995 Board of Directors' Meeting

The International Palm Society will hold its 1995 Board Meeting on October 26-29, 1995, in the Sarasota and Tampa area of Florida. Further details will be given in later issues of *Principes*.

Do You Have Questions About Palms?

Send your queries to: DR. KYLE BROWN, Rt. 2, Box 2700, Glenn St. Mary, FL 32040. Telephone: (904) 259-2754.

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The Chamaedorea Research Collection in Los Angeles

DONALD R. HODEL

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During the course of my research for the recently published book *Chamaedorea Palms*, I made over 600 collections of *Chamaedorea* throughout Latin America and from cultivation. These were dried and labeled, and the original set deposited in the Bailey Hortorium at Cornell University and duplicates in the appropriate institution of the country of origin. In most cases, flowers, fruits, and pinnae of each of the collections were preserved in FAA and are at the Bailey Hortorium for use in future anatomical studies.

In some instances, I returned with living material for which flowers and fruits were not observed in the wild for establishment in the research greenhouses here in Los Angeles. This cultivated material enabled me to obtain flowers and fruits, heretofore unknown, for many named and unnamed taxa. Observing, collecting, and studying flowers of cultivated plants from documented, wild localities has added immeasurably to our knowledge of *Chamaedorea*.

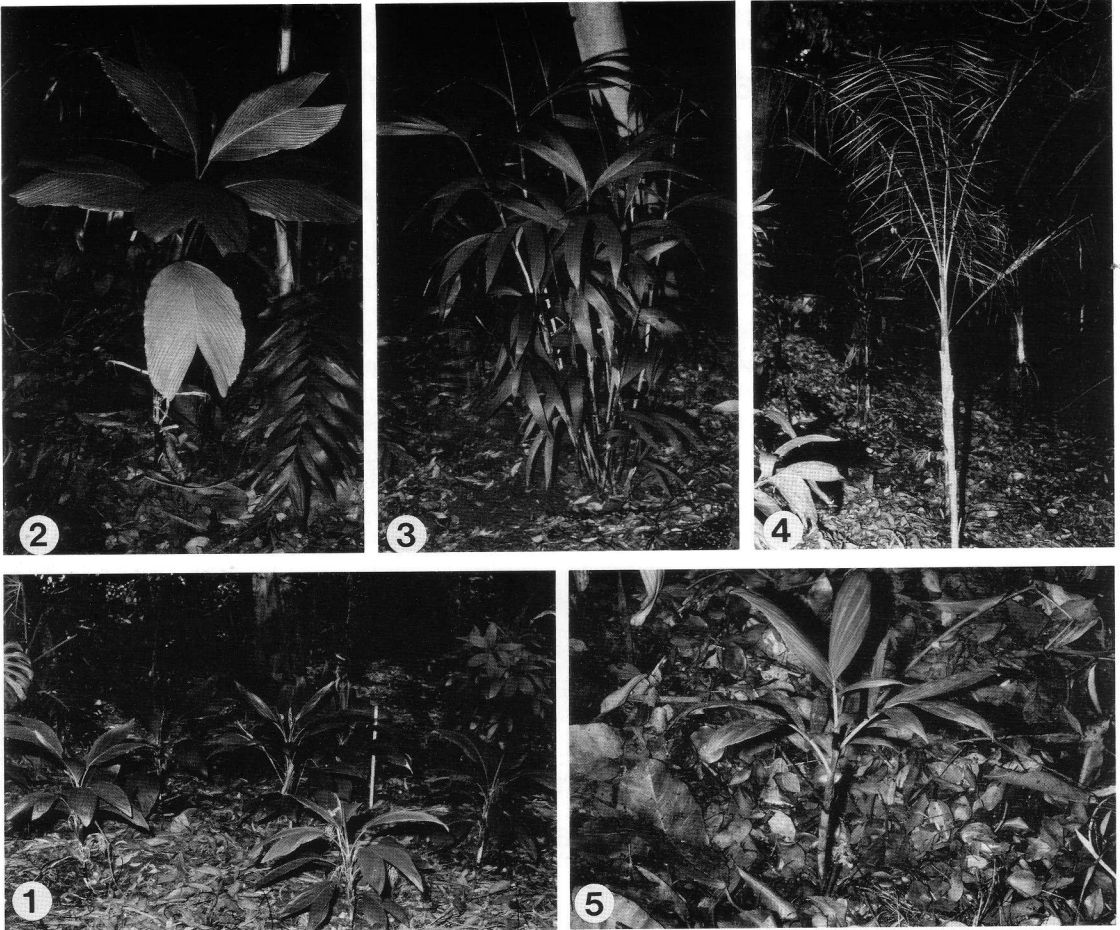
As the plants grew and developed and they were no longer needed for floral studies, I began to search for an appropriate facility where they could be planted out, their cultural requirements evaluated, and their potential for introduction to cultivation assessed. The planted-out material could also serve as mother blocks for seed production for interested collectors, hobbyists, nurserymen, and, even in a few cases perhaps, reintroduction to the wild.

After careful evaluation, I selected the Virginia Robinson Gardens as the site at which to plant out the *Chamaedorea* research collection. Located in Beverly Hills, the Gardens is a satellite facility of the more well known Los Angeles State and County Arboretum headquartered in Arcadia. The Gardens has several advantages as the repository of the *Chamaedorea* collection. Foremost among its outstanding attributes are its location on a south-facing, frost-free slope a few miles from the Pacific Ocean, a situation providing adequate heat

for growth yet is free of cold, damaging temperatures. Being in a permanent institution ensures that the collection will not be subjected to the uncertainties which often plague collections in the hands of individuals. A public facility, the Gardens is staffed by able and dedicated personnel who have shown a great interest in caring for the collection in a professional manner. As an old garden, there were existing trees that provided a well developed canopy under which the chamaedoreas were planted. The Gardens is relatively secure since it is in a residential neighborhood and is open to visitors by appointment only. Its proximity to Los Angeles enables me to visit it frequently. Finally, the Gardens seem financially secure since it has an endowment to supplement its public funds.

The Virginia Robinson Gardens had its beginning in 1911 when Mrs. Virginia Robinson, heiress to the Robinson Department Store fortune, built her home and began to plant her garden on six hillside acres west of Los Angeles. The Robinson estate would eventually become the first one in Beverly Hills. An avid gardener, Mrs. Robinson directed the layout and building of numerous terraces, interlocking footpaths, brick staircases, pools, and watercourses on her hillside lot. She obtained a wide variety of seeds and plants from various local nurseries and from as far away as Florida. Over the years she developed her estate into one of the premiere gardens in the greater Los Angeles area. Known as one of the most vivacious and popular hostesses in the city, Mrs. Robinson lived and entertained in a grand style, hosting an assortment of prominent and amusing visitors from statesmen to movie stars at her frequent and fashionable parties.

In her later years, Mrs. Robinson recognized the importance of ensuring that her beloved estate remain intact for the future benefit and enjoyment of the people of Los Angeles. Although Mrs. Robinson died in 1977 just a few weeks before her

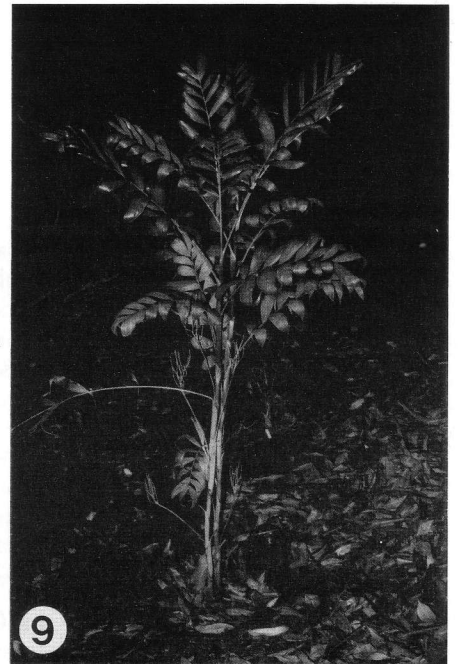


1. A group planting of *Chamaedorea ernesti-augustii* is typical of the manner in which the plants have been arranged in the collection at the Gardens. 2. *Chamaedorea amabilis* with bifid leaves and from Panama grows next to *C. pochutlensis* with pinnate leaves from Mexico. 3. *Chamaedorea fragrans* forms an attractive clump of stems with bifid leaves. 4. With finely pinnate leaves, *Chamaedorea glaucifolia* is an interesting study in texture. 5. The dwarf *Chamaedorea guntheriana* from Panama looks right at home in the Gardens.

100th birthday, she had in 1974 bequeathed her estate along with a handsome endowment to the County of Los Angeles to be used as a botanical garden or arboretum. The Los Angeles County Department of Arboreta and Botanic Gardens has administered the Gardens since 1977. Among the outstanding plants at the Gardens are the largest grove of king palms, *Archontophoenix cunninghamiana*, outside of Australia; an exceptional *Ficus* with numerous aerial roots dropping over 40 feet to the ground; and the largest Mexican hand flower tree, *Chiranthodendron pentadactylon*, in the United States.

The first increment of 39 plants representing nine species of *Chamaedorea* was planted out at

the Robinson Botanic Gardens in 1988. Subsequent plantings in 1989, 1990, 1991, and 1992 have brought the number of established plants to nearly 300 with 46 species represented as of 1992. Future plantings are planned and will add to the number of plants and species in the collection. One of the objectives in planting out the palms was to place as many plants as possible of a particular collection together in a group to make hand pollination easier and lessen the chances of cross pollination between species and even among different collections of the same species (Fig. 1). All plants are labeled and mapped and, although most have flowered, only a few produce fruits regularly at this relatively young age.



6. This form of *Chamaedorea nubium* from cloud forests on the Pacific coast of Oaxaca, Mexico has grown remarkably well. Note irrigation tubing around base of plant. 7. The dwarf *Chamaedorea pumila* has a leafy crown. Note staminate inflorescence. 8. This *Chamaedorea robertii* with bifid leaves has spicate inflorescences emerging from the base. 9. These two flowering plants of *Chamaedorea whitelockiana* have handsome crowns of leaves.

The following species in *Chamaedorea* are now successfully established in the collection.

C. allenii
C. alternans
C. amabilis (Fig. 2)
C. arenbergiana
C. brachyclada
C. brachypoda
C. cataractarum

C. costaricana
C. deckeriana
C. elegans
C. elatior
C. ernesti-augustii (Fig. 1)
C. foveata
C. fragrans (Fig. 3)
C. geonomiformis
C. glaucifolia (Fig. 4)
C. graminifolia

C. guntheriana (Fig. 5)
C. hooperiana
C. klotzschiana
C. macrospadix
C. metallica
C. microspadix
C. neurochlamys
C. nubium (Fig. 6)
C. oblongata
C. oreophila
C. pittieri
C. pinnatifrons
C. pochutlensis
C. pumila (Fig. 7)
C. quezalteca
C. radicalis
C. robertii (Fig. 8)
C. sartorii
C. scheryi
C. seifrizii
C. serpens
C. stolonifera
C. sullivaniorum
C. tenella
C. tepejilote
C. tuerckheimii

C. warscewiczii
C. whitelockiana (Fig. 9)
C. woodsoniana

The *Chamaedorea* collection is situated on a southwest to west-facing slope under the natural canopy provided by some of Mrs. Robinson's original trees, including *Pittosporum*, *Ficus*, and several *Eucalyptus* among others. These canopy trees supply a steady stream of fallen leaves that is permitted to collect on the ground and develop into a natural leaf litter around the palms, lending an ambiance to the collection not too dissimilar from that found in the wild. A drip irrigation system was installed to supply water and now its pipes and tubes are mostly obscured by the leaf litter. There are a few crude and rather rough paths through the collection and it is hoped that these can be improved and perhaps even paved in the future, enabling visitors to view the palms safely and more easily. Although visitors are encouraged, the Virginia Robinson Gardens is open by appointment only and those wishing to view the Gardens and its collections must make advance reservations.

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Principes, 38(3), 1994, pp. 157-160

Palms in Stone

WULF KILLMANN AND JOHN DRANSFIELD

Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia and Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, UK

In about the second century A.D., parts of Java, Sumatra, Malaysia, and Indochina fell under the influence of India (Coedes 1971). A number of large empires emerged, such as Majapahit in Java, Srivijaya in Sumatra, the Cham Empire around Da Nang in Vietnam, and the Khmer Empire in Cambodia. The most spectacular remains of the empires of that period are temple complexes, the two most renowned being Borobodur near Jogjakarta in Central Java and Angkor, east of Tonle Sap in Cambodia. Not only are these two temple complexes stunningly beautiful, but in their rich carvings depicting scenes of the life of Buddha or of Hindu gods and of everyday life at that time, they provide a window into a vanished world.

Between 880 and 1200, each Khmer king built his own temple, both as a place of worship for himself and as his later tomb. Between 1181 and 1201 A.D. the great ruler Jayavarman VII built the fortified city of Angkor Thom on the site of former temples (Coedes 1984). The city, covering some 10 square kilometers, was encircled by a moat. In the very center of the city he built the major temple, Bayon. The outer wall of the first level on this square, multilevelled building is decorated with a 1,200 meter long bas-relief depicting the various wars between the Khmers of those days and their neighbors, particularly the two wars with the Cham from the east. During the 1170s the Cham sacked Angkor Wat, and subsequently the new powerful king Jayarvarman VII routed them in turn. Among the scenes of war are more idyllic scenes of everyday life. In these scenes, three palms are easily recognized, the coconut

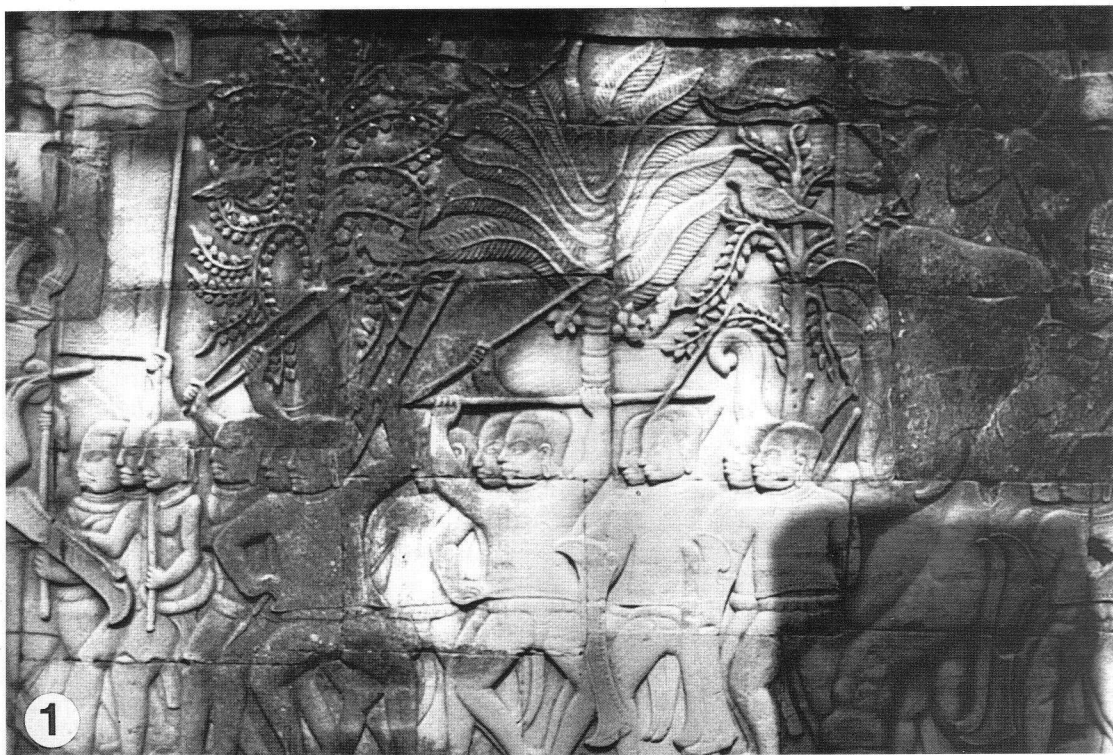
(*Cocos nucifera*), the palmyra (*Borassus flabellifer*), and the wild date (*Phoenix sylvestris*). Of these, the last was probably brought into the area by members of the Indian ruling class, while *Borassus flabellifer* can still be seen in abundance in the landscape surrounding the temple complex.

Construction of the great Buddhist Temple of Borobodur in Central Java is thought to have begun in about 775 A.D., with at least four main phases of development over the next 75 years (Dumarçay 1978). Constructed on a mound, the temple consists of a series of seven square terraces crowned by three circular terraces topped by a massive stupa. The walls of the square terraces form a stupendous art gallery in stone, the bas-reliefs depicting scenes of the life of Buddha. Amongst the human and animal figures can be seen palms. Sugar palms (*Arenga pinnata*), coconut (*Areca catechu*), and palmyra can all be distinguished if one uses a little imagination (Figs. 1-6).

These bas-reliefs in the Khmer Republic and in Java testify to the importance that palms have played in the everyday life of southeast Asia over the centuries.

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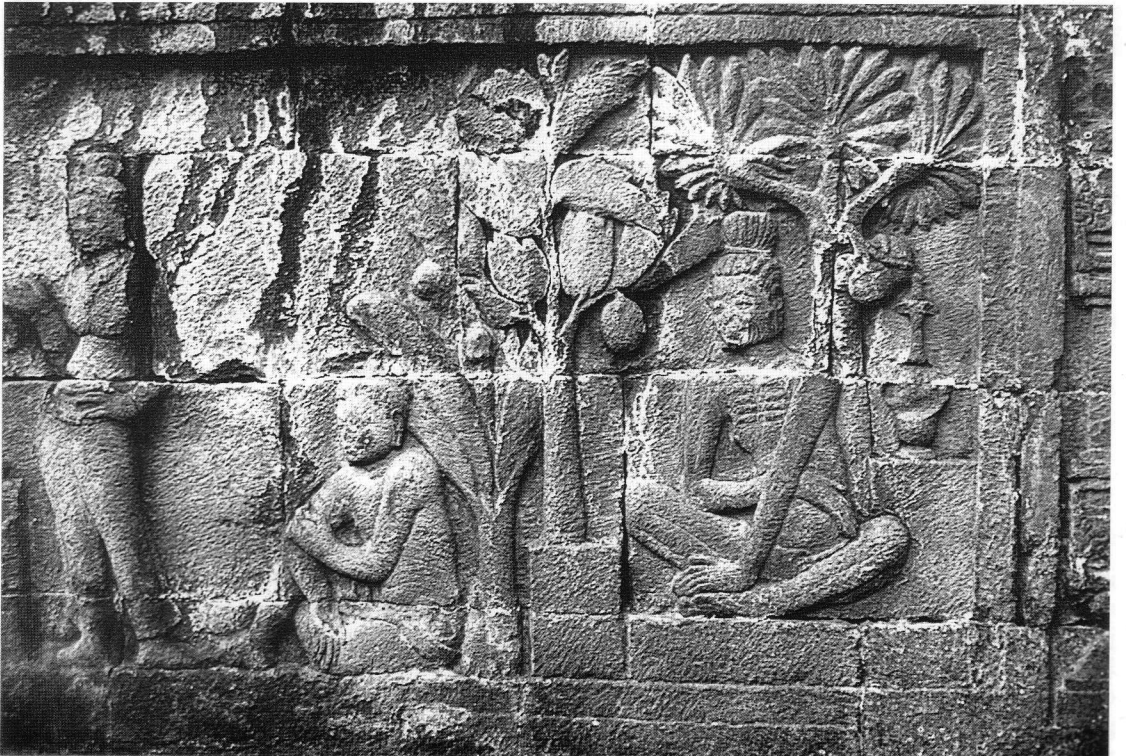
- COEDES, G. 1971. The Indianized states of Southeast Asia. Translated by S. B. Cowing. East-West Centre, Honolulu.
 ———. 1984. Angkor. Translated by E. F. Gardiner. Oxford in Asia Paperback, Oxford University Press, Singapore.
 DUMARÇAY, J. 1978. Borobodur. Oxford University Press, Kuala Lumpur, 72 pp.



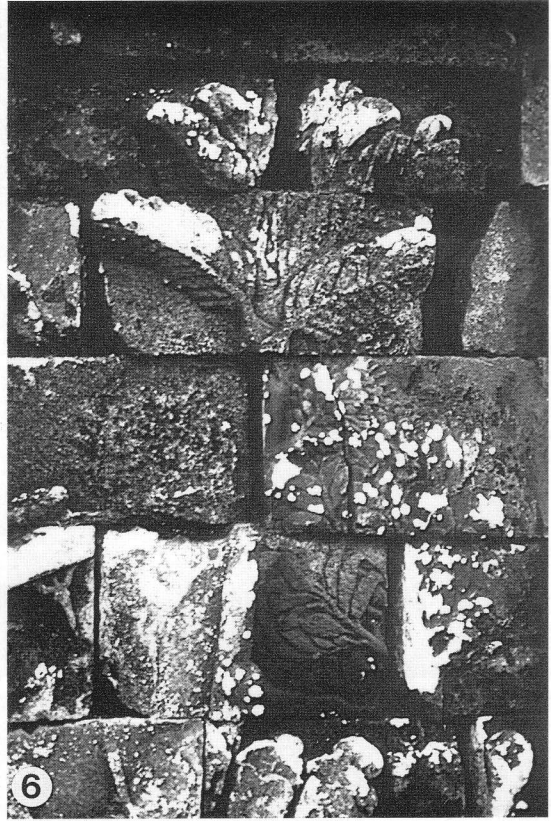
1. Angkor Wat. Cham warriors marching to the front. Amongst the trees in the background is a coconut palm, the number of umbrellas to the right is an indication of the rank of the officer riding the elephant. 2. Angkor Wat. Thai troops (allies of the Khmer) on their way to the front; in the center is a mature *Borassus flabellifer*.



3. Angkor Wat. Peace talks between subdued Cham (to the left) and Khmer officials; one can see banana plants on the left and a young *Borassus flabellifer* on the right.



4. Borobodur. A fruiting *Borassus flabellifer* can be seen on the right, a breadfruit tree and banana plant in center.



5. Angkor Wat. Warriors on the march; in the background is an Indian date palm. Note the rodents on the trunk trying to get at the fruit. 6. Borobudur. A betel palm, *Areca catechu*.

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PALM LITERATURE

A GUIDE TO PALMS AND CYCADS OF THE WORLD.
By Lynette Stewart. x + 246 pp. illus. Angus
& Robertson, Sydney, Australia. 1994. ISBN
0-2071764-3-4. Price: unknown.

A Guide to Palms and Cycads of the World "shows you how to identify and cultivate an astonishingly diverse array of these ancient and fascinating plants"—or so the message on the dust jacket tells us. This new addition to the ever increasing number of popular books on palms and cycads is an attractive publication, filled with color photographs. Many members of the Society will wish to purchase it on sight—the cover photographs of *Cyrtostachys renda* on the front and

Cycas pruinosa on the back are pretty compelling. The book will probably sell like hot cakes, and this says much for its attractive design and often excellent photographs. The photographs and beautiful lay-out will attract readers, who may go on to be enthused about palms and cycads. A closer look at the book, however, made me begin to question just how useful it really is for identification. In the following review, I shall discuss the palm component of the book only.

Lynette Stewart has gone to considerable pains to make sure that the nomenclature in her book reflects current thinking on palm genera, and she has done this, for the most part, very successfully. She has also given conservation ratings for all the species she discusses, an admirable innovation for such a popular book. The species descriptions are

clear, though occasionally I feel that the terminology she uses is still too technical for the sort of book she has written—no real matter, as the interested reader can always go to the glossary or a botanical dictionary, if the meaning is not clear. For the most part the information provided about individual species is correct. However accurate this information is, however careful the nomenclature has been researched and however laudable the citing of conservation status may be, if the palms illustrated are incorrectly identified, then all the positive aspects of the book as they relate to these misidentified palms are wasted—and this remains, for me, the Achilles heel of such popular illustrated palm books. For ultimately it will be the illustrations that will sell this type of book. I thus looked very carefully at the photographs. For the most part they have been very well printed, but some have been very strangely cropped—crownshafts sliced in two (e.g., *Hedyscepe* on p. 104), and leaf tips cut off (e.g., *Phoenix canariensis* on p. 151) or have been printed so small that details that would be useful to serve the stated aim of showing you how to identify palms have been lost. I feel that often it is not the fault of the photographs but of the book designer who has tried to cram too many pictures on some pages or has unnecessarily cropped what were probably good pictures in the first place. A few are clearly misidentified or the names have been misspelled. For example, on p. 20 *Calamus penicellatus* should be *Calamus penicillatus*; *Arenga westerhoutii*, described as being clumping is in fact solitary and I suspect the plant in the photo on p. 45 is in fact *A. obtusifolia*; the rattan illustrated as *Calamus usitatus* var. *palawanensis* on p. 69 is *C. siphonospathus*, a member of a quite different group of rattans; the *Caryota no* illustrated on p. 73 is certainly not *no* (one could say is *no no*), but is more likely to be *C. maxima*; *Dypsis hildebrandtii* illustrated on p. 97 is not that spe-

cies but probably *D. procera*; *Neodypsis lasteliana* on p. 140 is more likely to be *N. leptocheilos*; the illustration purporting to be of *Phloga gracilis* on p. 148 is probably of *Phloga nodifera*. *Phytelephas decasperma* (p. 153) should be *Ammandra decasperma*.

I wonder what purpose the line illustrations serve—this is quite the weakest part of the book—sometimes the drawing repeats information already in the photographs, at other times the drawing is so crude as to be unidentifiable.

There are also some interesting palms missing from the book—I cannot criticize that objectively—this is after all very much a personal selection of palms. However, it is a pity that there is no mention of *Chuniophoenix* (that is becoming quite widespread, and seems so easy to grow), *Vonitra*, *Mauritia* and *Mauritiella*, *Ceroxylon*, *Gaussia*, *Actinorhytis* and several other familiar and popular palms.

So much for the bad news. The good news I have already mentioned—this is really a very attractive book with a clear easily read and remarkably accurate text. Will it show you how to identify palms? I suspect that the answer is only some of the time, because of the unevenness of the quality of the photographs and the fact that the photographs are rarely comparable, and the line illustrations seldom help. The only popular book that I know of that really shows you how to identify common cultivated palms is George Stevenson's wonderful book (now sadly unavailable, and, in any case, much in need of updating) where the key characters for separating palms of similar appearance are clearly illustrated and compared. Nevertheless, Lynette Stewart has given us lots of information that will be of value to palm enthusiasts. I am sure it will sell well. Congratulations to the author for a beautiful book.

JOHN DRANSFIELD

Principes, 38(3), 1994, pp. 162-169

CHAPTER NEWS AND EVENTS

International Palm Society News from Venezuela Biennial

(Jim Cain, President)

At the recent Biennial, the International Palm Society Board of Directors reached several decisions of interest to members of the IPS. A short summary of these is given below.

A book on the *Palms of Madagascar* will be co-published by the Royal Botanic Gardens Kew (UK) and the IPS. A pre-publication offer for this book will be forthcoming later this year, with publication in 1995. The IPS also contributed to the funding of an Oxford University undergraduate *in situ* study program this year on the palm flora of Madagascar. A revised *Index to Principes* is also in the works from the IPS.

In addition, we will substantially increase the color content in the journal *Principes*, beginning when arrangements can be made. The board also agreed to increase the travel expense budget for the IPS Editors to improve editorial communications and coordination.

Two local palm societies were approved as affiliates of the IPS. The Venezuelan Palm Association (Asociación Venezolana de Palmas or AVEPALMAS) and the Palm & Cycad Society of Western Australia are now affiliate chapters of the IPS. Along with all other direct IPS affiliates, they will receive a gratis IPS membership in the name of their Society. The IPS will also provide a rather nice collection of available back issues of *Principes*, again at no charge. The total number of chapters is now twenty-one (21) around the world. Western Australia increases the number of direct affiliate chapters in Australia to three. Local Australian groups within PACSOA are also encouraged to affiliate directly with the IPS, in addition to their PACSOA affiliation. AVEPALMAS represents the first Latin American affiliate. We hope that more groups will follow.

New Board of Directors members for the term of 1994-1998 include Cheryl Basic (Australia, QLD), Alain Hervé (France), Horace Hobbs (USA, TX), Ken Johnson (USA, FL) and Bo-Göran Lundkvist (USA, CA). Directors re-elected to that term include Paul Anderson (Australia, NSW), Phil Bergman (USA, CA), Norman Bezona (USA, HI), John Dransfield (U.K.), Don Evans (USA,

FL), Edward Hall (USA, FL), Lynn Muir (USA, CA), Maxwell Stewart (USA, AL), Ralph Velez (USA, CA) and Natalie Uhl (USA, NY).

August Braun of AVEPALMAS was awarded an Honorary Membership in the IPS for life for his work with the Caracas Botanic Garden. His constant efforts over more than 40 years at the garden were evident to all who attended the Biennial.

For those planning ahead, the next IPS Board of Directors meeting will be held on the west coast of Florida (Sarasota/Tampa area) in the fall of 1995, October 26-29. The next IPS Biennial and General Meeting will take place in Orange County, California, in the summer of 1996, with post-biennial tour destinations to be advised. A 1998 Biennial venue of Thailand is also currently under discussion and evaluation. Further information on all meetings will be provided when plans are finalized.

Welcome to Two New IPS Affiliate Societies

At the 1994 Biennial meeting in Caracas, Venezuela, the IPS Board of Directors approved the affiliation of two additional groups. Welcomed as IPS affiliate societies are:

AVEPALMAS, the Venezuelan Palm Association.

Palm & Cycad Society of Western Australia, Inc.

The Palm & Cycad Society of Western Australia was formed a number of years ago in the Perth area of Western Australia and has a substantial core of active members. The Western Australia society initiated a palm garden area in local Gascoyne Park and has been responsible for plantings and maintenance in this garden for the past several years. Meetings are generally held at the Leederville Town Hall, Cambridge Street, Leederville, Western Australia. More information will follow in the next issue of the IPS Membership Roster (with October issue of *Principes*). For further information, contacts are:

Palm & Cycad Society of Western Australia, Inc.

P.O. Box 170, Como, 6152, Western Australia, Australia

President: Neil Jones, telephone (61)-9-448-9682

Secretary: Karen Knight, telephone (61)-9-444-7233

Treasurer: Christine Crump, telephone (61)-9-306-2956

The Asociación Venezolana de Palmas (AVEPALMAS) was formed in 1992 and has grown to a strong group of palm enthusiasts in the country. AVEPALMAS assisted greatly in planning and co-hosting the Caracas Biennial meeting and associated tours in June. For further information, contact:

Asociación Venezolana de Palmas (AVEPALMAS)

Atención Jesús Hoyos F., Sociedad de Ciencias Naturales La Salle, Apartado Postal 1930. Caracas 1010A, Venezuela

Or send to: AVEPALMAS % Atención: Francisco Monaldi/Roger Cardona Rodríguez, P.O. Box 02-5255 (034), Miami, FL 33102-5255, USA
President: Jesús Hoyos F., telephone (58)-2-782-8711

Vice President: Sven O. Nehlin, fax (58)-2-793-2447, telephone (58)-2-62.1737/0885, fax (58)-2-93.3401

INTERNET EMAIL address: snehlin@dino.conicit.ve

Treasurer: Francisco José Monaldi, Apartado Postal 52049, Caracas 1050-A. Venezuela

Secretary: Roger Cardona Rodríguez, Apartado Postal 52049, Caracas 1050-A. Venezuela

News from Western Australia

The May meeting of the Palm and Cycad Society of Western Australia featured Russell Dyer as auctioneer, who put 41 items under the hammer. The society made A\$600 from this auction, thanks to members' plant donations and spirited bidding. Bill Gaynor gave a presentation on eight species of *Dioon* at the June 20 meeting. A nice bottle palm was raffle prize for June.

The group met again on July 18 with Darryl Hardie speaking on the Atrium, palms and cycads of the Botanical Gardens in Adelaide, South Australia. An Annual General Meeting was also held. Neil Jones remains President. The July raffle featured a nice *Chamaedorea brachypoda* donated by Bill Gaynor and several seedlings donated by John Banasiewicz. On August 15, the Society met

to hear Garden Gossip and TAFE Lecturer Sue Leighton give a talk on mulch. This was followed by a palm raffle.

Sunday, June 26, was a workday at Gascoyne Park. A dozen hardy workers sprayed weeds and generally cleaned up after the storm that hit the Perth suburbs. This was followed by a BBQ cooked by Karen. An additional workday on July 24 saw nine hearty souls working in the garden. In addition to routine maintenance, they transplanted two big *Howea forsteriana* and a *Cocos* donated by Linda Therkelsen. Donations are also being locally solicited for palms for the "Jungle planting" at the park. Planting of this dense area of mixed palms will be scheduled for late September or early October.

The Western Australia Museum has created a pre-history garden to give the public some ideas of the types of plants that were growing millions of years ago. Currently in the garden are *Encephalartos gratis*, *Cycas revoluta*, *C. taiwaniana*, *C. circinalis*, *Zamia furfuracea*, *Macrozamia reidleyi*, *M. sp.*, *Lepidozamia peroffskyana*, *Chamaerops humilis*, *Livistona australis*, *L. decipiens*, *L. mariae*, tree ferns, other ferns, and a *Ginkgo biloba*. Members of the Society will donate other cycads.

The City of Perth recently moved a number of large *Phoenix canariensis* along the Boulevard in Floreat Park. Many were near power lines and were pruned (butchered) each year. Thanks to the City for fulfilling the Society's requests and spending the A\$70,000 to save these grand old palms. Most plants were moved to nearby residents' front gardens, which maintained the general character of the area but moved the palms away from conflict with the power lines.

At the Horticultural Spectacular on September 10 and 11, the Society will set up a palm and cycad display and sale. This will take place at the Roy Edinger Hall, corner of Canning highway and Stock Road, Melville. In addition to sales, there will be free seedlings for the children, potting demonstrations, and refreshments.

Southern California News

The Southern California Chapter of the International Palm Society met on July 16 at the Los Angeles Arboretum at 301 Baldwin Avenue in Arcadia. Bill Dickenson conducted a tour of the palm and bamboo garden and the new rainforest garden. A "concoction auction" of rare and spec-

imen palms was offered, with 50% of the proceeds going to the Chapter and the other 50% to the donor, with up to ten palms per donor allowed.

The September 17 meeting will be the first ever held at the California State University-Fullerton Arboretum. It is a lovely 25 acre site opened in 1979 with plantings arranged in various climatic groupings. The palm collection, while not extensive, contains many mature, well-maintained specimens of cold-tolerant species. Among these is a lovely *Brahea brandegeei* and one of the larger *Livistona mariae* in Southern California. The meeting will begin at 11:30 a.m., with a tour led by Bill Dickenson of the dry palm area just past the Clark Victorian house. Mr. Ricko Montenegro, Assistant Director of the Arboretum, will speak briefly about the gardens, followed by a potluck picnic lunch. After lunch, Ralph Velez will give a slide presentation on Palms of Venezuela as viewed at the recent June IPS Biennial. This will be followed by the raffle and auction. Palm donations to the Arboretum are solicited in lieu of normal garden fee.

Louie and Carol Hooper have invited members and guests to view their palm garden in La Habra after the Arboretum meeting.

News from the South Florida Palm Society

The South Florida Chapter met on July 16 at the East Ridge Retirement Village Activity Center for a panel discussion of Design and Installation of Palms in the South Florida Landscape. Also featured was a tour of the Village palmetum.

The South Florida Palm Society's Fall Palm Show and Sale will be held at Fairchild Tropical Gardens on November 5 and 6, 1994. Contact Ken Johnson (305-248-6006) or George Zammas (305-434-4660) for further information. The August 17 meeting at Fairchild Tropical Garden featured a review of the recent 1994 IPS Biennial in Caracas, Venezuela.

News from the Broward County Chapter

Meetings are held on the fourth Thursday of every other month at the Cooperative Extension Service Office on College Avenue in Davie, Florida. Meetings start at 7:30 p.m. Visitors are welcome!

Cynthia Giddy, author of "The Cycads of South Africa", gave a wonderful presentation at the May

1994 meeting. After a brief introduction to cycad morphology, Cynthia showed stunning slides of native *Encephalartos* in habitat. Some specimens were over 1,000 years old. Shown were *E. natalensis*, *E. lehmanii*, *E. ferox*, *E. latifrons*, *E. horridus*, *E. arenarius*, *E. trispinosus*, *E. eugene-maraisii* and *E. friderici-guiliemi*. Natural habitats varied from open grassland to sheer vertical cliffs. Additional slides were shown of *Strongeria eriopus*, *Encephalartos cycadifolius*, *E. ghellinkii*, *E. laevifolius*, *E. lebomboensis* and *E. woodii*. Only a male plant is known to exist of *E. woodii*. Cynthia discussed the illegal trade and poaching of cycads from South Africa. Collectors from around the world are willing to pay what amounts to a year's salary for one plant and the native people cannot be charged with poaching because they do not know it is illegal. Controlled propagation of some species in special nurseries is underway to insure their continuation.

The Broward chapter held their 2nd annual spring sale on May 7th & 8th at Flamingo Gardens. There were 30 vendors, who supplied 63 species of cycads and 455 species of palms. The weather cooperated and sales for Saturday alone exceeded last year's totals. T-shirts, fertilizer, and books were also on sale. Thanks to the Flamingo Gardens staff and to the South Florida Palm Society for use of cash registers and computer.

The July 28th meeting in Davie revolved around a giant auction. Plants available at the auction included *Cyrtostachys renda*, *Mauritiella aculeata*, *Kerriodoxa elegans*, *Polyandrococos caudescens*, *Johannesteijsmannia* spp., *Dypsis gracilis*, *Borassodendron machadonis*, *Cyphophoenix nucele*, *Encephalartos kisambo*, *Macrozamia* spp., *Zamia neurophilydia*, and many more.

As a follow-up to his March 24th presentation to the Chapter, Dr. Peter Mayotte wrote an article on "Pinanga in Southern Thailand and Peninsular Malaysia", which appeared in the July issue of the Broward County Palm & Cycad Society Newsletter. The newsletter also listed the many palms found at the St. Stephen Church, Pompano Beach—just east of Federal Highway (US 1) on NE 14th Street Causeway. Kenny Johnson planted these for everyone to enjoy.

Palm Trip to France

Fous de Palmiers (the French Chapter of the IPS) has invited members of the European Palm

Society and others in the International Palm Society to attend a joint International Summer Meeting in Menton, in the sunny south of France, between September 10 and 13. Liaisons assisting in different countries are Martin Gibbons (U.K., phone 081-876-3223), Jacques Deleuze (France, phone 95-38 50 78), Tobias Spanner (Germany, phone 089-1577902), Wilko Karmelk (Netherlands and Belgium, phone 1152-2041), Dario Peso (Italy, phone 6 523-61580). Martin is also a director of the International Palm Society as is Alain Hervé of Capdail, France.

Dates for the meeting coincide with the "Journées de Plantes Méditerranéennes"—an annual festival devoted to Mediterranean plants. The surrounding countryside is beautiful, the food delicious, and best of all, there are so many gardens and parks to visit, and so many palms and other exotic plants to see. The weather should be perfect this time of year. (See October News for more of this trip which was in progress as this issue was being prepared.—EDITORS.)

News from New Zealand

The Palm and Cycad Society of New Zealand celebrated their 10th year in June 1993. The group has now grown to almost 200 members. At the September 1993 meeting, Spencer Lawes brought his video "Indonesia—the Movie", with vivid images of his Indonesian escapade. The October 1993 meeting featured Derek Russell, Horticultural Manager of Eden Gardens, who presented a history of the gardens and plans for the future. In November, Gordon Waddell and Keith Boyer presented slides and discussed palms and other plants used in landscaping on the 'Big Island' of Hawaii.

The May 1994 meeting featured an additional video of their South American visit by Dick and Anne-Marie Endt. The theme of the meeting was Tropical Palms. June 1 featured a social evening and Annual General Meeting at the Auckland College. The July meeting featured a presentation by Kevin Johnston, Society President, about his recent Thailand trip.

On Sunday, March 20th, the Palm & Cycad Society took a field trip to Little Barrier Island. The large Nikaus (*Rhopalostylis sapida*) were impressive, as was the whole place. On Palm Sunday, about 50 members and friends of the Society enjoyed a field trip at Kawau Island in the Hauraki Gulf. The event coincided with the ripening of

seeds of the Kawau *Jubaea chilensis*. Members of the Garden History Society accompanied the group because of their shared interest in the gardens created by Governor Sir George Grey at Mansion House Bay. Robert Brassey, district archeologist for the Department of Conservation, welcomed the party with a bucket of freshly picked *Jubaea* seeds. A leisurely picnic lunch followed, after which Robert led a tour of the original garden's area. In addition to the two magnificent *Jubaea chilensis* specimens, there are substantial stands of *Livistona australis*, plus a few *Trachycarpus fortunei*. Department plans include restoration of the gardens to accommodate the original plantings as nearly as possible, including palms and cycads.

A field trip was planned for Tiri Matangi on Saturday, June 11th. Details will be provided in a later report.

New Zealand was represented at the June IPS Biennial in Caracas by Gordon Waddell and Keith Boyer, who also participated in a post trip into the interior of Venezuela. After the trip, Keith stated that this was one of the best such trips of his life. Slides will be presented at a future meeting.

Individual subscription memberships to the Palm & Cycad Society of New Zealand for subscribers outside New Zealand are US\$30 for initial membership or US\$25 for renewals. Add US\$5 for Family Membership. Members receive the Society's quarterly Magazine. Overseas members should pay in US Dollars with international money order or bank draft and not personal checks. Visa cards are also accepted for payment.

News from North Queensland

The North Queensland Palm Society and the Friends of the Palmetum held a joint meeting on May 2nd at the Tumbetin Lodge in the Townsville Palmetum. Greg Cuffe's talk on "Palms of Sarawak" featured many slides of these palms. Various members brought a cycad or a cycad frond for discussion, with a group discussion also held on various palm items. The NQPS also met on July 3.

The NQPS operates a lending library for its members. In addition, the NQPS Seed Bank is available to Australian and non-Australian members, subject to proper permits and certificates. If interested, contact Terry or Dorelle Hart, 49 Sargeant Street, Gulliver, Townsville 4812, North Queensland or phone (61)-77-752058.

News from South Queensland (Australia)

The South Queensland Group of PACSOA met in May. Stan Walkley advised that the Gardening Australia television show recently filmed a segment at his property, which was screened on July 19. Will Kraa gave a very interesting talk on propagating palms and cycads with generous tips from his own experience. Following supper, Stan showed a great collection of cycads which he has made into Bonsai specimens.

An outing to the 10th Anniversary of the Nambour Garden Expo was held on July 3rd. The group also met on July 18th at Bread House to view a video copy of John Dransfield's talk given at the PACSOA 10th Anniversary Dinner.

News from New South Wales, Australia

The Sydney Branch of PACSOA met in May to hold a general forum on palms. Discussion ranged from such topics as diseases and nutrient deficiencies in palms to sex among palms. The forum seemed popular with good participation by all. Two videos were also shown—one on the Daintree Rainforest Rescue Campaign by the Daintree Rescue Foundation and one on Chemicals in Society. The auction proved one of the largest ones, with most available plants being sold. At this meeting, Lynette Stewart showed her new book, "A Guide to Palms and Cycads of the World", and gave some insights into the problems associated with writing such a book.

At the July 19th meeting, Ian Edwards gave a slide presentation of his recent trip to the IPS Biennial in Venezuela and his travellings about the country. It was an interesting and rewarding trip with many unusual palms to be seen.

A Palm Society outing to the Joseph Banks Native Plants Reserve was held on August 14th. The reserve is a 2.5 hectare Australian native plants garden financed by the Sutherland Shire Council. Palm Society member Craig Thompson has been responsible for many of the plantings and consequently native palms and cycads feature prominently, along with ferns and rainforest plants. The site is a north-facing rocky hilltop and includes streams, ponds, cliffs, bridges, and an elevated walkway. The Reserve is located in Manooka Place, Kareela.

Sunshine Coast (Australia) News

The Sunshine Coast Group of PACSOA met on August 1st at the Nambour Band Hall, Daniel Street, Nambour, Queensland. Peter Heibloem gave a slide presentation on "Cycads in Habitat—Zimbabwe", featuring cycad colonies he filmed on a recent trip to Africa. The meeting also featured a selection of slides from outstanding cycad gardens from South Africa and Zimbabwe. Raffle prize at the meeting was a 14" tub *Livistona mariae*.

A social outing was held at Harry's Restaurant, Lindsay Road, Buderim on August 6. These social evenings are always very successful.

The Sunshine Coast display and presentation at the recent Nambour Home Garden was first class. Many beautiful rare palms and cycads were exhibited to an admiring public.

News from Gold Coast Tweed (Australia)

The Gold Coast Tweed Palm & Cycad Society of PACSOA met on June 13th at the Miami High School. Dale Schubert gave an informative talk on the Cane Weevil Borer and its effects on palms. Generally this pest attacks sugar cane, but can also develop a fondness for palms. First found in northern Queensland nearly 100 years ago, it has worked its way south with the aid of man, and has now been found active in the Gold Coast Tweed area [near the Queensland/New South Wales border]. The adult beetle is approximately 10 mm in length (0.4 inch). Larvae feed on the pith of the palm causing dehydration damage and perhaps death. Another good reason to abide by agricultural import and export restrictions!

A field meeting was held on August 14th at the home of Hank Rossen at 31 Rifle Range Road, Willow Vale (near Ormeau), Queensland. After lunch, the group held a brief meeting at the Mulumlimby Palm Park. This was followed by a visit to a nursery in Billinudgel.

News from Texas Chapter

The Texas Chapter met on May 7 at the home of Gordon and Shirley Hintz in Cypress. The Hintz garden contains a number of cold-hardy palm species as well as over 30 varieties of eucalyptus. In addition, there are a number of citrus trees and a vegetable garden. Guests were treated to a sumptuous spread of cold cuts and vegetables, desserts,

etc. Chapter President (and new IPS director) Horace Hobbs provided the seedling of the month which was *Trachycarpus* "Takegui".

On July 23, over 30 members and guests gathered at Jim and Elizabeth Cain's home in Houston to eat Texas barbecue and visit around the landscaped pool, shaded on the sides with palms of every sort. Afterwards, everyone headed into the house for a slide show on the IPS Biennial in Caracas and the post-biennial tour taken by the Cain's in Venezuela. Seedling of the month was *Phoenix paludosa*, sprouted by Jim from seeds he brought from Singapore last year.

On August 13, the Texas Chapter met at Grant Stephenson's Grower's Mart in Houston. Grant features numerous large specimen palms available for sale. Included were several of the *Butia* Queen cross (*Butia capitata* × *Syagrus romanzofiana*), with several up to 10–15 feet in height. Grant also had quite a few lovely *Jubaea chilensis* in 24-inch boxes. *Allagoptera arenaria*, the lovely Brazilian Seashore Palm, were available in up to 15 gallon containers, but were sold prior to the meeting. Grant also had *Livistona muelleri*, *Nannorrhops ritchiana*, *Phoenix dactylifera* and many others, including the more common species. Seedlings of *Trachycarpus martianus* were donated by Grant. A fajita dinner and refreshments were served—with a frozen margarita machine as a meeting precedent! Following the meeting Grant gave a demonstration of his "Tiki Head" carving, with chain saw, side-wheel grinder, and power sander. In about 5 hours, Grant can transform a dried-out dead palm base into an attractive Tiki, complete with wiry hair (the root ball). These are perfect for adding that distinctive look to the palm garden.

The Texas Chapter will meet on September 10, 4–7 p.m., at Darren Oeschler's lakeside garden in Seabrook, south of Houston. A light dinner will be served. This garden is currently under construction and features a good assortment of very large palms that Darren has transplanted from Galveston and the Galveston Bay Area. Come prepared to fish or swim.

The October meeting and Member's Sale will be held on October 15 at the home of Horace Hobbs and his wife Cynthia. Numerous nice palm seedlings and a few special specimen plants will be available for sale to members.

A special Palm Tour of the southern Rio Grande Valley of Texas is planned by the chapter on

November 12–13. This will be a weekend tour of palm nurseries, private homes, and the Native *Sabal* Palm Sanctuary run by the Audubon Society near Brownsville. Ruth Merrill of Bay View and Horace Hobbs of Houston are coordinating the event. Contact them if you would like to join the tour.

Gulf Coast Chapter News

The Gulf Coast Chapter of the International Palm Society met on April 10 in Pensacola, Florida, at the home of Tom Mignerey and his spouse. Palm-related news was reported from various chapter areas—these reports were given by Frank Storli (Panama City, FL), Tom Mignerey (Pensacola), Maxwell Stewart (Mobile, AL), Tom Gwaltney (Theodore, AL) and McKune Dudley (Dauphine Island, AL). Wilbur LeGardeur also gave a report to the Gulf Coast Chapter on plantings of many *Phoenix dactylifera* and *P. canariensis* trees in New Orleans, Louisiana.

Hayes Jackson gave members an update on the new "Southeastern Palm & Exotic Plant Society", with members from Alabama, Georgia, South and North Carolina, and Florida. The group is establishing a demonstration garden in Savannah, Georgia, where they recently held a joint meeting with the Florida First Coast Chapter of the International Palm Society.

On July 10, the Gulf Coast Chapter of the IPS met at the West End Men's Club, Panama City, Florida, hosted by Frank Storli. A barbecue luncheon took place at noon, followed by a meeting and auction.

News from Louisiana

The Louisiana Chapter of the International Palm Society met on August 14th at Plymouth Palms, 3336 Plymouth Place on the West Bank of the Mississippi River, across from New Orleans, in Algiers. Hosts for the gathering were Gary Fleming and Isidore Grisoli.

The Chapter President, Danny Braud, is hosting an open house on Sunday, September 18 with food, drinks and mirth for all. Danny has perhaps the largest collection of palms in Louisiana, with over 100 species, most of which are in the ground. These are interspersed with various tropical plants in a one-acre park-like setting. Danny has added a front garden since the reception for the IPS Board of Directors held in October 1993.

The Louisiana Chapter will join the Gulf Coast Chapter for a joint meeting in Mobile, Alabama, in October.

Above Chapter News items by Jim Cain

Central Florida Palm Society (CFPS)

On May 29, CFPS members visited two gardens on the Gulf Coast to enjoy two of the area's finest palm and cycad collections. In the morning we visited the home of Mike Perry in Englewood. After an excellent guided tour of the garden we headed north stopping for lunch—then on to Byron and Libby Besse's residence in Sarasota. In addition to having another excellent tour by our hosts, we met Cynthia Giddy from the Republic of South Africa. Attendance exceeded 70 people. After concluding the meeting with a plant sale, the cycad lovers held a brief meeting with Mrs. Giddy on cycads of South Africa.

Plans are being completed now for a two-day meeting the last weekend in October for the Orlando area. The itinerary will include a tour of Leu Botanical Gardens, a visit to Bobicks' Nursery, followed by a barbecue and beer party on Saturday. On Sunday we will head to Disney World for a tour of Discovery Island and lunch.

Ed Hall

Palm Beach Palm and Cycad Society News

The May 4th meeting was held at Mounts Botanical Gardens. Bill Jones conducted a review of palm culture and an introduction to palm taxonomy. Paul Craft provided some "mystery palms" free for the taking.

Saturday, May 14, was a work day at Norton Sculpture Gardens, where over 300 species of palms are planted amongst numerous sculptures. On June 11, the team returned to Norton Gardens for its monthly work day.

At the June 1 general meeting Ken Hill talked on cycads of Australia with special reference to the new species being found there.

The April 9 and 10 Spring Sale held at Morikami Park was most successful. For the first time since moving the sale to Morikami, it did not rain. Over \$23,000 was grossed at the sale with over \$19,000 due to plants. Nineteen vendors participated. Dale Holton, the sales chairman, received a big thank you for all his work and dedication. Another thanks went to all the volunteers who helped with cashing, security, loading plants

and fertilizer into cars, and setting up the sale. Make your plans to attend the next sale now! The Palm Beach Fall Sale is planned for Oct. 1-2, 1994.

The Society purchased three good-sized *Satakentia* palms from Kurt Decker at the end of the sale for planting in the Japanese museum at Morikami Park. *Satakentia liukiuensis* is the only native palm to the Ryukyu Islands.

Recently the Society donated a laptop computer to the Fairchild Garden palm staff.

Video tapes of the recent palm seminar on diseases and nutrition are now available. These are professionally done videos of all the lectures held March 9th and provide an excellent reference. For details call Paul Craft at 407-793-9029.

Ed Hall

First Coast (Florida) Chapter News

On May 7, a dozen members spent half the day working at the palm gardens of the Florida Community College at the Jacksonville South Campus. The garden was established in 1989 and designed to include as many as 57 palm and cycad taxa. New additions included a three-year old specimen of *Sabal domingensis* grown from seed collected in the Dominican Republic by Ed Brown, three species of date palms (*Phoenix* cv 'Tunis', *P. theophrasti*, *P. rupicola*) and 2 cycads (*Ceratozamia mexicana* and *Dioon edule*). Several *Washingtonia robusta* were lifted from the garden and utilized in the Hart Bridge Expressway interchange project.

On June 4, a major step in transforming a drab interchange into a classic landmark occurred. The Florida Department of Transportation approved the planting of 60 palms at the intersection of Hart Bridge Expressway (SR. 228) and University Boulevard (SR. 109). The tear-shaped perimeter of each cloverleaf was planted with 58 *Washingtonia* spaced 30 feet (9.1 meters) apart with a *Phoenix canariensis* (Canary Island date palm) near the center. All palms were donated and planted by chapter members.

Ed Hall

Fous de Palmiers

On April 17, 1993, Pierre-Olivier Albano gave a conference in Montpellier on palms grown throughout the city and in the area surrounding the city. While Montpellier is located on the Med-

iterranean coast, the city and environs periodically experience cold snaps, sometimes accompanied by snow and strong winds.

Nevertheless, this city boasts a fabulous collection of century-old palms and members of our association are planting more and encouraging municipal authorities to follow suit. Monsieur Albano, a pharmaceutical student studying for his degree, published a booklet entitled "Palmiers Rustiques d'Exterieur a Montpellier et Ses Environs". More than 100 copies have been sold and it has been reprinted to satisfy the demand.

The following weekend, on April 24, Steve Swinscoe hosted a slide show, escorting the more than 100 people present on a stroll under the palms of California and Florida, following his trip there to attend the 1992 Miami Biennial. He was assisted by Jacques Deleuze, who identified palms seen in Florida. That evening Fous de Palmiers signed up eight new members and enjoyed a buffet dinner together at the Park Hotel organized by Violette Decugis and Sylvette Viale.

June 4 was the date of our annual visit to the gardens of the Villa Les Cedres at Saint Jean-Cap Ferrat, near Nice, conducted by one of our founding members, Rene Hebing. As usual, this tour was a huge success and has become an association tradition.

On Saturday, June 19, family, friends and members of the association gathered at the Domaine de la Castille at La Crau near Toulon to plant a palm in memory of Alain Moinié, who passed away the previous October. A warm homage was pronounced as the specimen of *Washingtonia filifera* was planted. We thank members

of our chapter as well as foreign friends whose contributions made this planting possible.

One of the highlights of the 1993 year was a visit to the gardens of the city of Menton, the last city on the French Riviera before crossing the border into Italy. Member Edoward Mazzola took more than 50 enthusiastic members on a guided tour of the gardens of the Villa Maria Serena, huddled next to the Italian border and boasting fine specimens of *Butia eriospatha* and *Phoenix roebelleni* as well as a 5-meter tall *Howea forsteriana*, a rarity along the Riviera, not to mention the tall *Phoenix* and *Washingtonia* species. The next stop was in the center of town to admire the gardens of the Orient Palace. Here we viewed century-old palms between 10 and 20 meters tall of *Syagrus romanzoffiana*, *Washingtonia robusta*, as well as species of *Phoenix* and *Sabal*. The tallest palms included two *Brahea brandegeei* reaching more than 20 meters as well as a *Livistona australis* of comparable height. A bushy specimen of *Rhapidophyllum hystrix*—a rare palm for Europe—grows in the garden. It will never reach the heights of the previous palms but remains in a class of its own. Following these two visits, Edoward and Simone invited everyone to their home high in the hills of Super Garavan, with probably the finest view around of Menton and the Mediterranean down below. There we enjoyed chili con carne at poolside, surrounded by their fabulous palm and citrus collections.

This summary of 1993 activities provided by Steve Swinscoe.

Principes, 38(3), 1994, pp. 169–170

PALM RESEARCH, 1993

COMPILED BY SASHA BARROW

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ANDREW HENDERSON

*New York Botanical Garden,
Bronx, NY 10458*

(We apologize for the late appearance of "Palm Research" for 1993. In future years we hope to publish this list in the April issue.—EDITORS).

Please bring to our attention any item that should be included here. In general, we are excluding research on the agronomy of important cultivated species (oil palm, date palms, rattans, and coconuts).

New Books

Flora of French Guiana: Areaceae. By J. J. de Granville. Institut Français de Recherche Scientifique pour le Développement en Coopération, Paris. 1993. 26 pp. Price unknown.

A cyclo-styled booklet on the palms of French Guiana, with keys to genera and species. The descriptions are accompanied by excellent line-drawings showing habit as well as leaf, flower, and fruit details.

Identifying Palms: The New Compact Study Guide and Identifier. By M. Gibbons. London: Apple Press. ISBN 1-85076-406-9. 1993. 80 pp. Price £4.95.

One hundred and twenty-two commonly cultivated palms are nicely illustrated and briefly described in this small book.

Palma Pilihan untuk Seni Taman. By Ismail Saidin. Dewan Bahasa dan Pustaka, Kementerian Pendidikan Malaysia, Kuala Lumpur. ISBN 983-62-3741-0. 1993. 216 pp. RM 40.00.

Palms and Cycads beyond the Tropics. By Keith Boyer. Palm & Cycad Societies of Australia, Milton. ISBN 0-9587931-6-6. 1992. 150 pp. Price unknown.

A beautifully illustrated book on palms and cycads that can be cultivated in subtropical regions, and beyond. The emphasis on cultivation will no doubt appeal to many palm society members.

Plant Resources of South-East Asia: No. 6. Rattans. Edited by J. Dransfield and N. Manokaran. Wageningen: Pudoc Scientific Publishers. ISBN 9022010570. 1993. 137 pp. Price unknown.

Rattans of South India. By A. C. Lakshmana. Evergreen Publishers, Bangalore-560 040. 1993. 180 pp. Price unknown.

A useful account of the systematics, utilization and conservation of the rattans of south India, including silvicultural information on a few selected species.

Taxonomic Articles

BALICK, M. J. 1991. A new hybrid palm from Amazonian Brazil, *Oenocarpus × andersonii*. Bol. Mus. Paraense Emilio Goeldi, Bot. 7(2): 505-510.

DIAZ ROCHA, P. E. 1992. Arariba (*Centrolobium tomentosum*); palmitero (*Euterpe edulis*) Mart. Rebraf 4(2-3): 4-7.

MORAES, M. 1993. *Allagoptera brevicealyx* (Palmae), a new species from Bahia, Brazil. Brittonia 45: 21-24.

MOYA, C., A. LEIVA, J. VALDES, J. MARTINEZ-FORTUN, AND A. HENDERSON. 1991. *Gaussia spirituana* Moya et Leiva, sp. nov.: una nueva palma de Cuba Central. Rev. Jardín Botánico Nacional 12: 15-19.

WEINER, G. AND W. LIESE. 1993. Genetic identification key to rattan palms based on stem anatomical characters. IAWA Bull. 14(1): 55-61.

Current Research

Sasha Barrow, Royal Botanic Gardens, Kew, is working on a monograph of the genus *Phoenix* for her doctorate.

Scott Zona, Fairchild Tropical Gardens, Florida, is preparing a revision of the genus *Drymophloeus*.

(To be continued in October 1994 with General Interest Articles)

Back Cover

Chrysalidocarpus decipiens growing on a rocky hillslope west of Ambositra, Madagascar. Photo by David DuPuy.

BOOKSTORE

- *A GUIDE TO PALMS AND CYCADS OF THE WORLD.** (L. Stewart, 1994, 246 pp. full color, line drawings and maps for each genus) 35.00
- A GUIDE TO THE MONOCOTYLEDONS OF PAPUA NEW GUINEA, PART 3, PALMAE** (R. J. Johns and A. J. M. Hay, Eds., 1984, 124 pp.) 8.00
- BETROCK'S GUIDE TO LANDSCAPE PALMS** (A. W. Meerow, 1992, 153 pp. all color) 29.00
- BRAZILIAN PALMS**, Notes on Their Uses and Vernacular Names (C. Pinheiro and M. Balick, 1987, 63 pp.) 9.25
- CHAMAEDOREA PALMS** (D. Hodel, 1992, 350 pp., 127 pp. of superb color) EXCELLENT! 49.95
- COCONUT RESEARCH INSTITUTE, MANADO** (P. A. Davis, H. Sudasrip, and S. M. Darwis, 1985, 165 pp., 79 pp. color) 35.00
- CULTIVATED PALMS OF VENEZUELA** (A. Braun, 1970, 94 pp. and 95 photographs) 7.95
- CYCADS OF THE WORLD** (D. Jones, 1993, 312 pp., 250 color photos) 45.00
- DESERT PALM OASIS** (J. W. Cornett, 1989, 47 pp., 41 pp. color) 8.95
- DISEASES AND DISORDERS OF ORNAMENTAL PALMS** (A. R. Chase and T. K. Broschat, 1991, 56 pp., color on each page) 29.00
- ECUADORIAN PALMS FOR AGROFORESTRY** (H. B. Pedersen and H. Balslev, 1990, 105 pp.) 15.00
- FLORA NEOTROPICA INTRODUCTION AND THE IRIARTEINAE** (A. Henderson, 1990, 100 pp.) 23.00
- FLORA OF TROPICAL EAST AFRICA, PALMAE** (J. Dransfield, 1986, 52 pp.) 23.00
- FLORE DES MASCAREIGNES** (La Reunion, Maurice Rodrigues, 1984, 31 pp.) 8.00
- FLORIDA PALMS**, Handbook of (B. McGeachy, 1955, 62 pp.) 3.95
- FLORIDA TREES AND PALMS** (S. A. Rose, A. A. Will, Jr., T. B. Mack, 1984, 30 palm species, 120 pp.) 6.00
- GENERA PALMARUM** (N. W. Uhl and J. Dransfield, 1987, 610 pp.) 79.00
- HARVEST OF THE PALM** (J. J. Fox, 1977, 244 pp.) 30.00
- INDEX TO PRINCIPES** (Vols. 1-20, 1956-1976, H. E. Moore, Jr., 68 pp.) 4.00
- KEY GUIDE TO AUSTRALIAN PALMS** (L. Cronin, 1989, 180 pp., 85 pp. color) 21.95
- MAJOR TRENDS OF EVOLUTION IN PALMS** (H. E. Morre, Jr., N. W. Uhl, 1982, 69 pp.) 6.00
- OIL PALMS AND OTHER OILSEEDS OF THE AMAZON** (C. Pesce, 1941, translated and edited by D. Johnson, 1985, 199 pp.) 24.95
- PALEM INDONESIA** (in Indonesian) (Sastraprdja, Moge, Sangat, Afriastini, 1978, 52 illustrations, 120 pp. For English translation add \$3.00) 5.50
- PALMAS DEL DEPARTAMENTO DE ANTIOQUIA** (Palms of Colombia, in Spanish; G. Galearno and R. Bernal, 1987, 207 pp.) 18.95
- PALMIERS, POUR LES CLIMATS TEMPERES** (Alain Moinie, 1991, 157 pp. in french, lots of black & white photos) 45.00
- PALMS** (M. Gibbons, 1993, 80 pp. Identifying 120 species in color, description, habits & cultivation) 10.95
- PALMS AND CYCADS AROUND THE WORLD** (J. Kremen, 1990, 267 pp., 267 pp. color) 45.00
- PALMS AND CYCADS BEYOND THE TROPICS** (Keith Boyer, 1992, 160 pp., 120 color photos) 20.00
- PALMS IN AUSTRALIA** (David Jones, 1984, 278 pp., over 200 color photographs) 40.00
- PALMS IN COLOUR** (David Jones, 1985, 93 pp.) 14.95
- PALMS OF THE NORTHERN TERRITORY (AUSTRALIA)** (A. White, 1988, 41 pp., 21 photographs, some color) 5.95
- PALMS OF THE WORLD** (Formerly **PALMS**, A. Blombery & T. Rodd, 1982, 192pp., 212 color photographs) 34.95
- PALM SAGO** (K. Ruddle, D. Johnson, P. K. Townsend, J. D. Rees, 1978, 190 pp.) 10.00
- PALMS OF THE SOLOMON ISLANDS** (Dowe, Dennis, McQueen, Birch, 55 pp., 39 pp. photos, 8 in color) Four excellent chapters 9.95
- PALMS OF THE SOUTH-WEST PACIFIC** (J. L. Dowe, 1989, 198 pp., 33 pp. color) 29.95
- PALMS OF SUBEQUATORIAL QUEENSLAND** (Robert Tucker, 1988, 91 pp., 12 pp. color, many black and white photographs and maps) 20.00
- SECRET OF THE ORIENT DWARF RHAPIS EXCELSA** (L. McKamey, 1983, 51 pp.) 5.95
- THE GENUS PTYCHOSPHERMA LABILL.** (F. B. Essig, 1978, 61 pp.) 6.50
- THE INDIGENOUS PALMS OF NEW CALEDONIA** (H. E. Moore, Jr., N. W. Uhl, 1984, 88 pp.) 12.00
- THE STRUCTURAL BIOLOGY OF PALMS** (P. B. Tomlinson, 1990, 477 pp.) 120.00
- TROPICA** (A. Graf, 7000 color photos, 1,138 pp.) 165.00
- TROPICALS** (G. Courtright, 1988, 153 pp., Color Pictorial sourcebook & descriptions, 12 pp. of palms) 34.95
- TROPICAL RAINFOREST** (A. Newman, 1990, 241 pp., World survey of endangered habitats, all color.) 45.00
- PALM PAPERS (Postage Included)
- A NEW PRITCHARDIA FROM KAUA'I, HAWAII** (Reprint from *Principes*, R. W. Read, 1988, 4 pp.) 2.00
- FURTHER INFORMATION ON HARDY PALMS** (J. Popenoe, 1973, 4 pp.) 2.00
- NOTES ON PRITCHARDIA IN HAWAII** (D. Hodel, 1980, 16 pp.) 2.50
- RARE PALMS IN ARGENTINA** (reprint from *Principes*, E. J. Pingitore, 1982, 9 pp., 5 beautiful drawings) 2.75
- PALMS FOR SOUTHERN CALIFORNIA** (Trish Reynoso, 1990, 11 pp.) 3.00
- PALMS FOR TEXAS LANDSCAPES** (R. Dewers & T. Keeter, 1972, 3 pp.) 1.25
- PINANGA ISSUE OF PACSOA** (#16, 1987, 17 pp.) 2.50
- RHAPIS PALMS—CULTIVATED SPECIES AND VARIETIES CULTURE AND CARE OF THE LADIES** (Lynn McKamey, 1989, 10pp.) 2.00
- THE HADIEST PALMS** (J. Popenoe, 1973, 4 pp.) 2.00

* New arrivals

The palm books listed above may be ordered at the prices indicated plus \$2.50 extra per book to cover packaging and postage. (California residents please add 7.25% sales tax.) Foreign checks must be in U.S. dollars and payable on a USA bank. In some countries it is possible to send U.S. International Money Orders through the Post Office. No credit cards. Please include your International Palm Society membership number. ALL SALES FINAL. Send check payable to: The International Palm Society, Paulean Sullivan, 3616 Mound Avenue, Ventura, CA 93003, U.S.A.

